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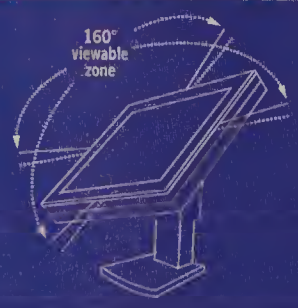

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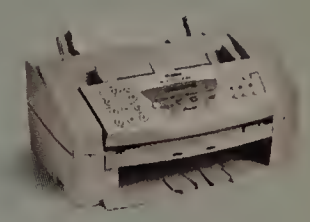

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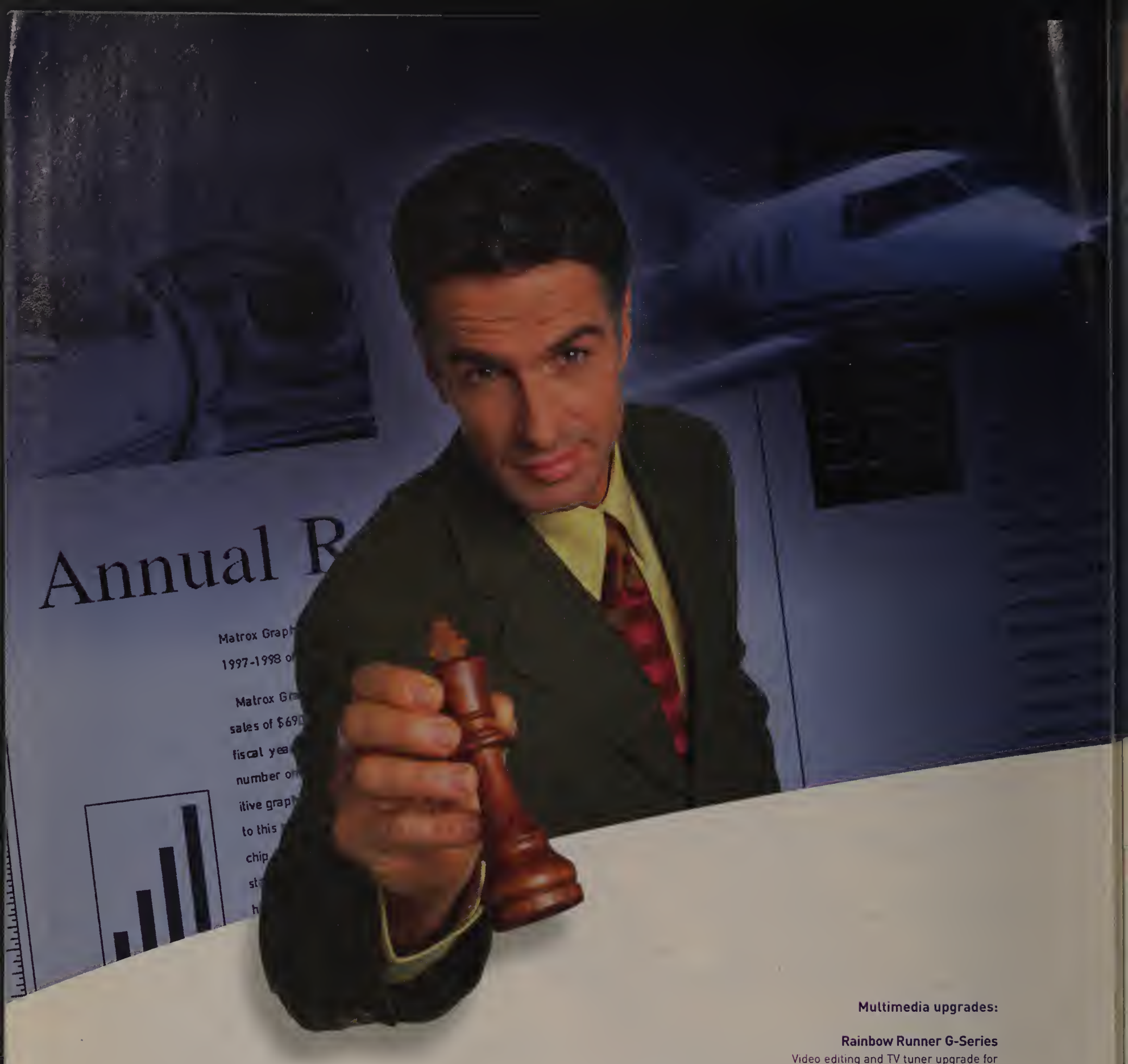

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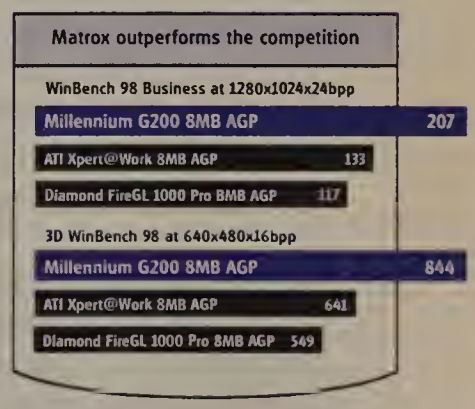

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OCTOBER

VOLUME 16 ◆ NUMBER 10

COVER STORY

100 **THE TROUBLE-FREE PC: TIPS, TWEAKS, AND TROUBLESHOOTING TACTICS**

HOW-TO Is your processor poky? Does your hard drive dawdle? Got a maudlin modem? Should you cram more RAM into your Pentium-166? We'll show you how to get improved performance without paying thousands of dollars for a new system. Here's the inside scoop on kick-starting your underperforming PC, including new Win 98 hardware secrets.

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REVIEW Stop squinting at mammoth spreadsheets squeezed onto your rinky-dink 15-inch monitor. Seventeen-inchers have become the desktop standard. Today's choices are less bulky, better at graphics and text, and as cheap as $419.

140 **PALMTOP PCs GROW UP**

REVIEW The first personal digital assistants—with their tiny screens, balky keyboards, and poor handwriting recognition—flunked usability tests. But we give higher grades to the latest palmtops and handheld PCs. Here's the skinny on which PDAs will help organize your business day.

167 **WHERE THE BUYS ARE: BEST AND WORST MAIL-ORDER AND WEB VENDORS**

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Once you've bought software and peripherals over the phone or on the Web, you may be tempted to give up retail. Should you? To find out, *PC World*'s undercover team shopped for, bought, and returned products from 11 top companies.

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Software and hardware vendors lure customers with gaudy rebate offers. But will you ever see any cash back? Not necessarily.

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Just because a server has the latest chips doesn't mean it will deliver the best performance. We cranked up seven corporate and small-business servers—testing their file-, database-, and Web-serving capabilities—and turned up surprising results.

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COVER *Photography by Stan Musilek*

ICONS: JEFFREY PELO

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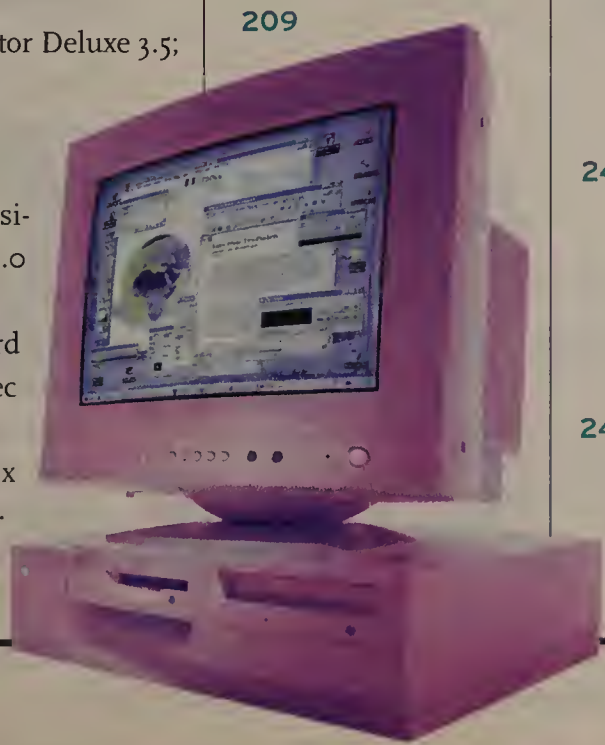

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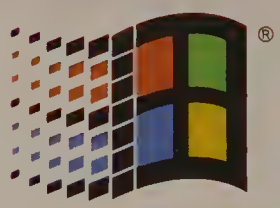

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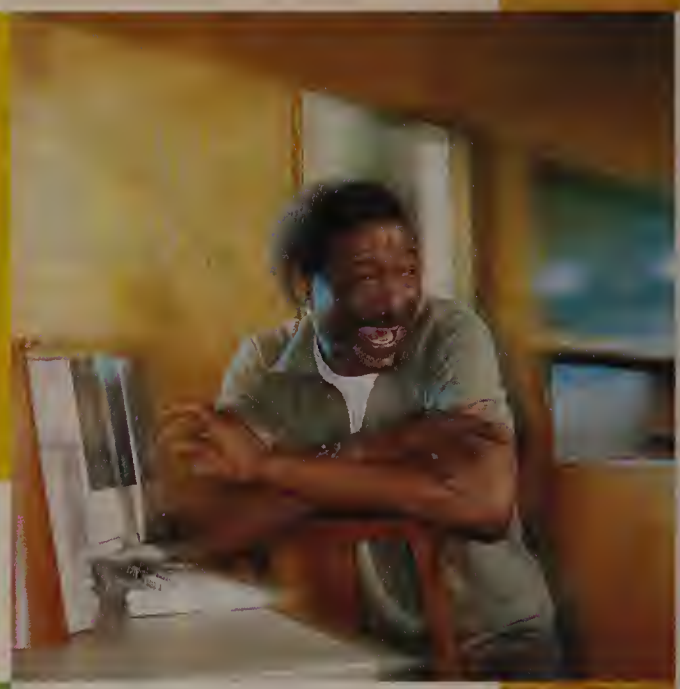

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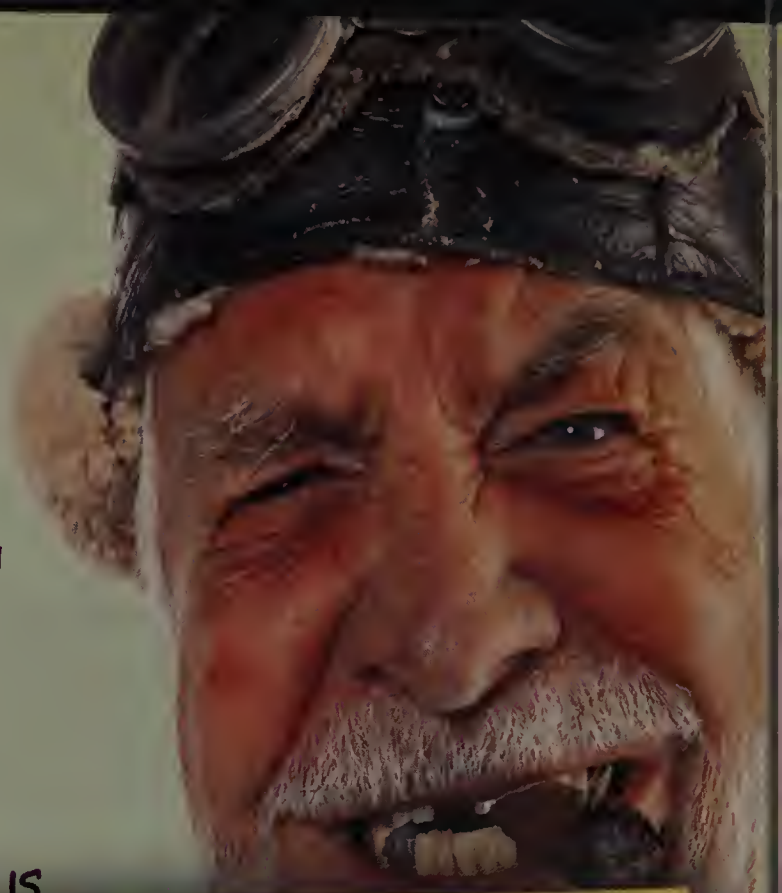

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My Two Tips for PC Troubleshooting

CAR BUFFS SAY the microprocessor has spoiled all their fun, taking over everything from tune-ups to braking. With PCs, it's just the opposite. They have microprocessors at the core, yet we can tinker with PCs endlessly. Whether we're trying to boost performance, free disk space, or eliminate a nuisance, we can spend hours or even days changing components, parameters, and settings.

Some of us delight in the pursuit of PC perfection. Others resent every minute required to coax a labor-saving device into working properly. And then there are the foolhardy, like me. Having only 30 minutes available to upgrade one of my PCs, I recently added four components simultaneously: RAM, a new CPU, a new graphics card, and a 3D accelerator. For a few minutes, I thought I'd gotten away with it. The PC's BIOS setup program behaved as though everything were okay. The self-test recognized the CPU, said the memory passed, and turned matters over to the operating system. But progress halted at the Windows 95 splash screen.

What had gone wrong? Had Windows 95, confronted by four components that didn't match its Registry information, hurled itself upon its sword? Had the Plug and Play automatic configuration facility eyed the new components and taken the easy way out? Was the DIMM seated properly? How about those jumpers on the system board that have to be changed to set the voltage, multiplier, and clock speed for the new CPU—had I set all of them correctly? The possibilities were endless.

Without the caches, Win 98 loaded—ever so slowly—like a wounded rat paddling through a vat of mercury.

A BIG BANG AND A WHIMPER

MY HARDWARE TROUBLESHOOTING was very nearly endless, too. I checked the jumpers and the seating of the components. After a few dozen experiments, I was convinced that the hardware was okay. So I decided to reinstall the operating system to start with a fresh Registry. But why reinstall Win 95 when I could upgrade to Windows 98? Booting from floppy, I installed Win 98, only to have it die at the splash screen. A few dozen more experiments, and I decided to install Win 3.1. Died at the splash screen, just like its smarter brothers. Would DOS 6 work? You bet. So it had to be a software problem, right? And there had to be a way around it.

Days and sleepless nights later, I sheepishly asked the PC World Test Center for help. When I explained the situation to Test Center Director Julian Milenbach, he looked into my bloodshot eyes and told me the Big Bang approach to upgrades was a sure recipe for disaster. Under the circumstances, I decided not to argue. He and Associate Test Center Director Uli Diehlmann generously put performance analyst Robert James on my case. Robert reinstalled Windows 98. It died at the splash screen. Then he did something I hadn't thought of: he used the BIOS setup program to turn off the CPU caches. Without the caches, Windows 98 installed and loaded—ever so slowly—like a wounded rat paddling through a vat of mercury.

AN EVIL OMEN

IF THE JUMPERS were set correctly, why did the CPU work only with caches turned off? Alas, it was too late to find out: I had to go home and pack for a long-planned vacation. Unfortunately, a cloud now loomed over that vacation. It, too, was an upgrade! I had used airline upgrade certificates to pay for part of it. This was an evil omen. Everything on this holiday would go wrong unless I got the world's slowest pumped-up PC working properly before I left.

One by one, I rechecked the jumpers on the system board. They were, indeed, sitting in the right spots for my new CPU. Nevertheless, I tweezed out each of the red plastic jumpers and eyed them at close range. The fourth jumper—the one that controls power to the CPU—was missing the internal copper sleeve it needed to function correctly. I found another jumper and replaced the defective part. Then I turned on the PC, used the setup program to activate the CPU caches...and an amazing thing happened. The PC booted fast. Win 98 recognized each component, installed the right drivers, and ran Microsoft Word and NBA Live 98 swiftly and flawlessly.

Though it's at least theoretically possible that my Big Bang upgrade would have worked if a healthy jumper had been in place, changing everything at once greatly complicated my troubleshooting. So take two tips from me: Upgrade one thing at a time; and never trust a jumper until you can see the copper inside. For sound advice about handling a host of more common PC problems, read "The Problem-Free PC: Tips, Tweaks, and Troubleshooting Tactics," by Jim Aspinwall, Harry McCracken, and Stan Miastkowski. The life you save could be your own.

Phil Lemmons is editorial director of PC World. ■

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YOUR TAKE ON: Smashing spam ◆ AOL, pro and con ◆ Faster start-ups

SOFTWARE AND BABYWARE

WHAT WOULD HAVE happened if Henry Ford had been allowed to sell and own all the highways, tollbooths, and vehicle licenses ["Buy Intel, Buy Microsoft, Sell Babies," *Up Front*, August]? He could have licensed only vehicles of his own make and decided where and when people could drive, as well as demanded any data, however personal, for the privilege. Microsoft will have such control. The abuses allowed by the class structure of prerevolutionary France will pale in comparison to what such control of information implies. And no revolution will be possible.

Gregory Philip Hayes
Fort McMurray, Alberta

YOUR RIDICULOUS editorial leaps from one irrational conclusion to another. You malign the terms "free enterprise," "competition," and "justice," mentioning them in the same breath as the Sherman Act.

Free enterprise in a capitalist system inherently denies antitrust laws. The idea of "equalizing" a free market system is ludicrous. Coercive monopolies only come into existence through government interference (and a monopoly that is not coercive, by definition, cannot hurt the consumer).

Laws like the Sherman Act have no place in a capitalist republic—they are the gruesome standard of welfare, socialist, and communist states alike. A state promoting freedom retains for its citizens the right to property—an unalienable right.

As a devoted reader of *PC World*, I had thought you would not lower yourself into the media orgy of ignorant hatred aimed at Microsoft and Intel. These two companies revolutionized the computing world, and I assumed at least a slight shred of respect would be paid to them. I was wrong.

Zachary Sachs
Austin, Texas

AOL DEBATE

HAVEN'T YOU spent just about enough time bashing America Online ["Giving America Online the Heave-Ho," *Got a Problem?* August]? AOL is not an Internet service provider; it is an online service that provides Net access. Serious Net users should find a dedicated ISP. But I find AOL to be a valuable add-on. Its proprietary content is outstanding, and its efforts to make cyberspace friendly have largely been successful.

And AOL is truly national. When I have to travel, AOL access lets me remain connected to the office with minimal cost and effort. When AOL went to unlimited access, it dreadfully underestimated the resulting increase in demand, and getting online was difficult. But things have improved drastically. The busy signals I get these days are few and far between. It's easier to log on to AOL than to a popular area ISP.

With its $9.95-per-month Bring Your Own Access Plan, AOL is a good value.

Joe Reimers, South Bend, Indiana

I RECENTLY signed on with AOL and have been happy with it. However, I got a surprise on my bill. The CD-ROM I was sent was a version that defaults to the Bring Your Own Access payment plan of $9.95 a month plus surcharges for the amount of time online. When I called AOL, its response was that it gave fair warning of these charges during the registration/installation process, when you are told the BYOA program is being installed. But where are the options? Customers who aren't savvy about the Net could find this expensive if they think ▶

HOT BUTTON

Spam Versus Trees: Our Readers React

MY INITIAL RESPONSE to Jeff Kalvin's letter ["Send a Spam, Spare a Tree," August] was, "That makes sense." On further consideration, I have to add, "But not today."

Reason: Most hard-copy junk mail is from people offering popular merchandise like books, music, videos, gardening supplies, and clothing. If I could get the equivalent via e-mail, that would be a pretty good deal. Unfortunately, the spam I get is nearly all for "adult" Web sites and get-rich-quick schemes.

If and when the sleaze merchants and scam artists who clog my in-box give way to sellers of legitimate merchandise, I will join Jeff in welcoming their messages online. Until then, I'll remain on the antispam bandwagon.

Frank V. Priore, College Point, New York

THE SUGGESTION THAT e-mail spam saves trees is ludicrous. That's as ridiculous as saying that photocopiers save trees by eliminating carbon paper. The resources consumed by spamming—the drain on our electronic environment and on our personal productivity—are a new burden on our society.

Jordan Lee Wagner
Newton, Massachusetts

AS THE WEBMASTER of the Colorado Sierra Club, I've met and worked with many legitimate environmentalists. Spammers have about as much claim to being environmentalists as the Unabomber did.

Spam discourages use of the Internet as a communications mechanism by increasing costs and noise level. Spammers are the weeds in the flower garden that must be rooted out if we're ever to make effective use of the medium and reduce the use of paper for legitimate communications.

Charlie Oriez
National Legislative Chair, Association of Information Technology Professionals
Littleton, Colorado

Editor's note: For more on spam, see this month's *Full Disclosure*, page 332.

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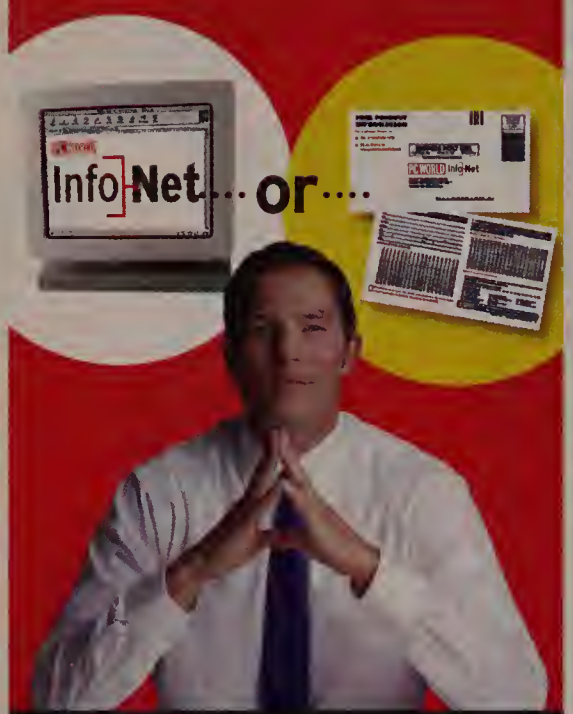

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they're on flat-rate unlimited access. And how many of us actually read the Terms of Service agreement or pop-up notices? I feel that people should be more aware that AOL's discs may default to a more expensive plan than a user may want.

Ina Lee, Philadelphia

Editor's response: AOL says that after installation, users can change their plans online at the AOL keyword 'billing'.

FILE MANAGER NOT MISSING

ANYONE WHO, like Scott Spanbauer, thinks File Manager is missing ["Surprise! Windows 98 Isn't Perfect," August, page 103] should take a look in the Windows directory. Microsoft never, to my knowledge, dropped File Manager; it just made Windows Explorer the default. Win 95's winfile.exe is in Win 98 and is virtually identical to the old File Manager of Win 3.*x*. So if you have been cursing Windows Explorer and long for File Manager to return, just set up a shortcut to winfile.exe and smile again.

Rick Shear, Merrillville, Indiana

Author's response: The problem is, File Manager doesn't work with Windows 95/98's long file names. This means you can't see the long file names already on your drives, and if you copy, move, or rename files with such names, those names will be lost. This could really gum things up if a program or Windows itself expects to find a file based on its long file name. **–Scott Spanbauer**

FASTER AND SLOWER START-UPS

I READ YOUR August issue with great interest, but came away feeling confused. On page 102 of your article "Windows 98: Making the Upgrade Work," you say "Windows 98 does a good job of accelerating start-up." Yet on page 60 [*Top of the News*], the article "Seeking Speed? Windows 98 Disappoints" states, "Apps can launch in half the time. But your system will probably start slower; and shutting it down can take just as long or longer."

Gordon M. Cotton
Notre Dame, New Brunswick

Editor's response: Nice catch. To clarify, Win 98 does a good job of accelerating the start-up of some applications, but it will still take longer to load Windows itself. Our apologies.

STOP WHINING!

TO ALL THE people who constantly whine about Windows 95/98's bugs: As a user of Win 95 since it came out, I have had my share of problems, and I have no love for Microsoft. But you get what you pay for. If you buy cheap hardware, you'll have more problems than if you spend the extra money on name brands. Cheap hardware skimps on the details and cuts corners, creating incompatibility problems with your operating system and peripherals. I never buy cheap hardware, and my problems have all but disappeared.

John Drake
Vancouver, British Columbia

PC World *welcomes your responses, ideas, and other letters to the editor.* *See page 14 for contact information.* ■

CORRECTIONS AND CLARIFICATIONS

IN SEPTEMBER'S *Windows Tips*, we said Windows NT 4.0 has no year 2000 problem. This is true only if you apply NT Service Pack 3.

In the same issue, the privacy report's bookmark page had one misprint; the correct URL for Vince Cate's Cryptorebel and Cypherpunk Page is www.csie.nctu.edu.tw/~htcheng/Security_README.html.

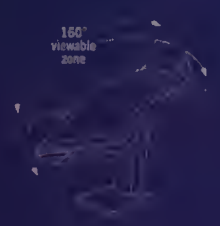
In September's *Top 100*, we incorrectly stated that the 12th-rated Premio Apollo BX 350 on the Power Desktops chart does not ship with speakers; in fact it comes with MLI-270 36-watt 3D speakers. Also, the correct support hours for TigerDirect on the budget chart are 15 on weekdays, 9 on Saturdays.

In "Windows 98: Making the Upgrade Work" (August), we stated that the utility package Nuts & Bolts 1.04 is compatible with Windows 98. However, Network Associates (the vendor) says that the product is not fully compatible with Windows 98 and that most users will have to purchase an upgrade.

The same article gave a URL where visitors could download a utility for converting to the FAT32 file system. Microsoft has since changed the URL to www.microsoft.com/windows/downloads/contents/admintools/win98fat32/default.asp.

In July's "Godzilla-Size Hard Drives," we said that Fujitsu drives do not support the Ultra-ATA standard; in fact they do.

PC World regrets the errors.



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Look Out—You Are Being Followed

Web site cookies track and profile you—even from sites you haven't visited. But you can control them.

ILLUSTRATION: RICK SEALOCK

NOT LONG AGO, I had what could only be described as a life-changing experience. Cyberlife, that is.

It all started when I bought my first book from Amazon.com, the savvy bookstore that pioneered online shopping. I was short on time, so rather than making the trek to the neighborhood bookstore, I decided to give Amazon.com a try. In just a few minutes, I'd found the book and placed my order. It arrived two days later, thanks to a complimentary upgrade to priority shipping.

With that single transaction, I became an evangelist for the wonders of online shopping. In no time, I was back at Amazon.com, ready to place another order. That's when I discovered I had unwittingly received more than I paid for when I bought that first book.

As most larger online merchants do, Amazon.com had left behind a browser cookie or two on my hard drive, the effects of which became clear during my next visit to the site. Instead of the anonymous browsing I'd grown accustomed to at online stores, this time I was greeted with, "Welcome back, Roberta Furger!" and presented with a list of recommended books, based on my earlier order.

Now, I'm all for personalized service (I love it when the attendant at the gas station remembers my name), but this was eerie. I'd only bought one book from Amazon.com, and voilà! —my name and my taste in books were automatically called up the next time I visited the site.

Amazon.com knew who I was thanks to selectively placed cookies (text strings it planted in a file on my hard drive and used to reference specific information in the site's database).

WE KNOW WHO YOU ARE

SUDDENLY, THE ESOTERIC discussions I'd long ignored about Internet cookies took on a whole new—and highly personal—meaning. Intrigued and disturbed by the ease with which cookies can be used to track consumer behavior, I did what any good reporter would do: I started researching the subject, exploring both the advantages and the downsides of cookies. And believe me, there are both.

First I looked at my cookie.txt file in Netscape Communicator 4.0 (Internet Explorer users would check the Cookies folder in the Windows directory). And I found dozens of entries made by sites ranging from Amazon.com to Yahoo to Major League Baseball. Like most users (I suspect), I hadn't customized my browser's security preferences to warn me before it accepted cookies. So for months the file had grown, as each new site I visited added its own entries.

To my surprise, some of the cookies were from sites that I had never visited or even heard of. For instance, I'd never browsed the Barnes & Noble online bookstore, and yet there was an entry for the site in my cookie file. And what about the entries for Focalpoint, DoubleClick, and AdForce? Clearly, it was time to learn a little more about cookies and the companies that were freely placing them on my hard drive.

To keep closer track of the accumulation of entries, I changed my preferences in the ▶

browser's security options to notify me before accepting any cookies. I then deleted the contents of the Netscape Navigator cookie.txt file and started surfing to see what would turn up.

Just about every site I visited wanted to place at least one cookie on my hard drive, and some sites wanted to drop in several. In most instances, I was able to get into a site even if I refused to accept a cookie, but not without perseverance. For example, I had to refuse the Dell Computer site's remarkably insistent cookie requests about 15 times before I could get into it.

But you don't have to visit a company's Web site to wind up with one of its cookies. It turns out I got that Barnes & Noble cookie courtesy of a visit to the Book Review section on the New York Times site. Along with it was one from www.focalink.com, the URL for a Web-based marketing firm called AdKnowledge.

Similarly, a visit to the automobile section of the Times site spawned a cookie from Imigis, another Web-based advertising agency, and a trip to the travel section of Business Week Online yielded a cookie from Trips.com, an online travel agency specializing in business travel. Even the PC World Online site will deliver cookies from its advertisers.

HOW THE COOKIES CRUMBLE

ALTHOUGH THE RULES of the Web's HyperText Transfer Protocol (better known as HTTP) state that one site cannot deposit a cookie for another, Internet marketing firm DoubleClick (www.doubleclick.net) came up with a clever way to circumvent this provision.

David Whalen, creator of the FAQ file on Cookie Central (www.cookiecentral.com) explains it this way: "As you load a page from a given site (like AltaVista, for example) there are pieces of that page (specifically, the banner advertisements) that come from other sites. Since your browser actually connects to DoubleClick to get the ads on the page, DoubleClick can send you a cookie—even though you're on AltaVista."

And as my little experiment illustrated, DoubleClick isn't the only online business that's taking advantage of this loophole. Although some cookies are temporary—expiring at the end of the day or the end of a visit—others are what are called "persistent" cookies, staying on your hard drive for months or even years. Such cookies may be used by an online merchant to call up the items in its database that refer to you—hence, Amazon.com's ability to customize my visit to the site or offer one-click ordering.

Some consumers object to cookies being used for any and all forms of consumer tracking. I'm inclined to be more flexible on the practice. I enjoy the convenience and customization that customer tracking can bring, as long as I have willingly given the site information about myself for its purposes alone. ▶

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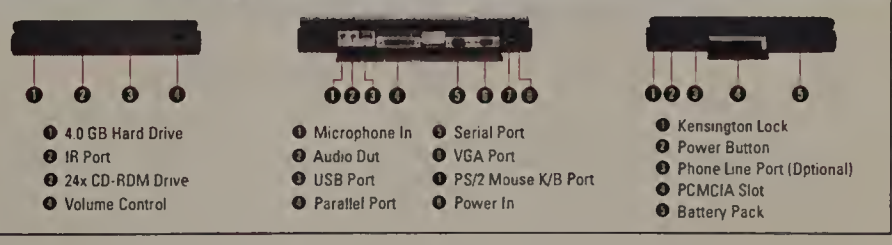

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On the other hand, I'm offended when cookies are used for tracking by companies I've never done business with —without my permission or knowledge. I loathe the covert capability that tracking cookies give an advertising or marketing firm to tailor ad banners to fit my interests, and I detest even more the notion that third parties might be compiling information from several sites to develop a profile of Roberta Furger.

That's why I've opted for a longer-term solution to the unwanted-cookie problem: anticookie software. There are numerous programs you can select from. (For more information on anticookie software, see "The Defenders" in last month's *PC World*.) I chose Cookie Pal, an easy-to-use filtering shareware program that goes beyond the rudimentary notification features in either Netscape Communicator or Internet Explorer. Cookie Pal keeps track of cookies, summarizing after each session, for example, the number of accepted and rejected cookies; it also lets me develop lists of sites from which I will always—or never—accept cookies.

Each time I visit a new site, the software notifies me of a cookie request. Like the browser itself, Cookie Pal gives me the option of accepting or denying the individual request, but Cookie Pal also allows me to add the site to my permanent list—and thereby eliminate the multiple queries whenever I visit a site.

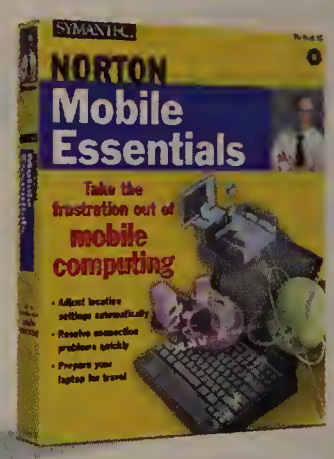
Do I enjoy adding cookie management to my already long list of computer-related chores? Not a chance. But considering the alternatives, it's a price I'm willing to pay for a modicum of privacy.

How do you deal with cookies? Let us know by writing to consumerwatch@pcworld.com. Roberta Furger is a contributing editor for PC World *and author of* Does Jane Compute? Preserving Our Daughters' Place in the Cyber Revolution *(Warner Books, 1998).* ■

MIND YOUR COOKIES

WANT TO TAKE control of your cookies? Here are some tips on how to start:

- **Set your browser** to warn you before accepting cookies. In Navigator, go to *Edit•Preferences•Advanced* and select your preferences. In Internet Explorer, go to *View•Options•Advanced.*
- **Educate yourself.** One of the best sources for cookie information is Cookie Central (www.cookiecentral.com), which includes a primer on how cookies work, a step-by-step guide to reading your cookie file, and an excellent frequently-asked-questions section.
- **Be selective** about the information you volunteer about yourself. Cookies themselves don't track people, they just point to the site's database in which the information resides. Share only necessary information and only with sites that you intend to frequent.



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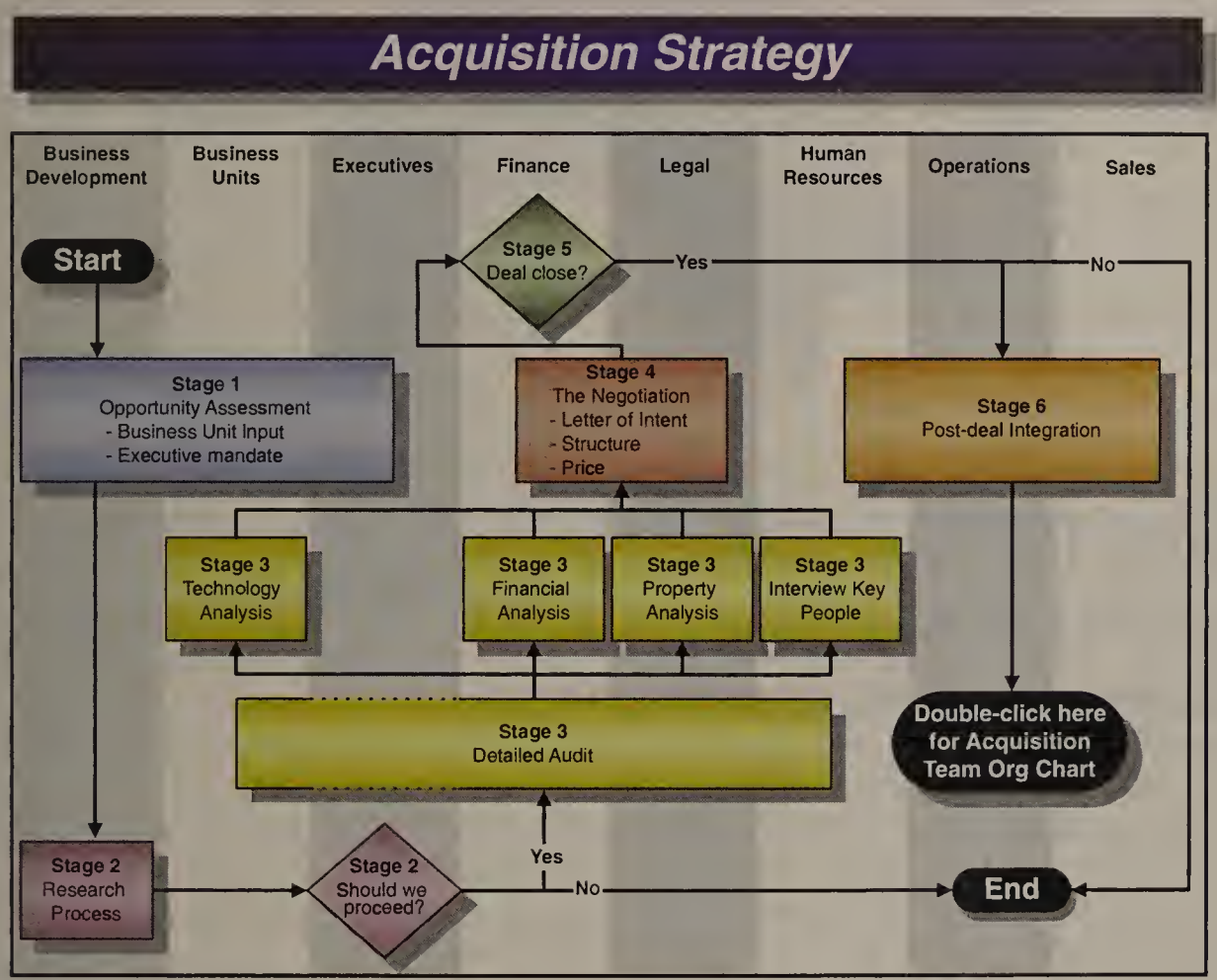

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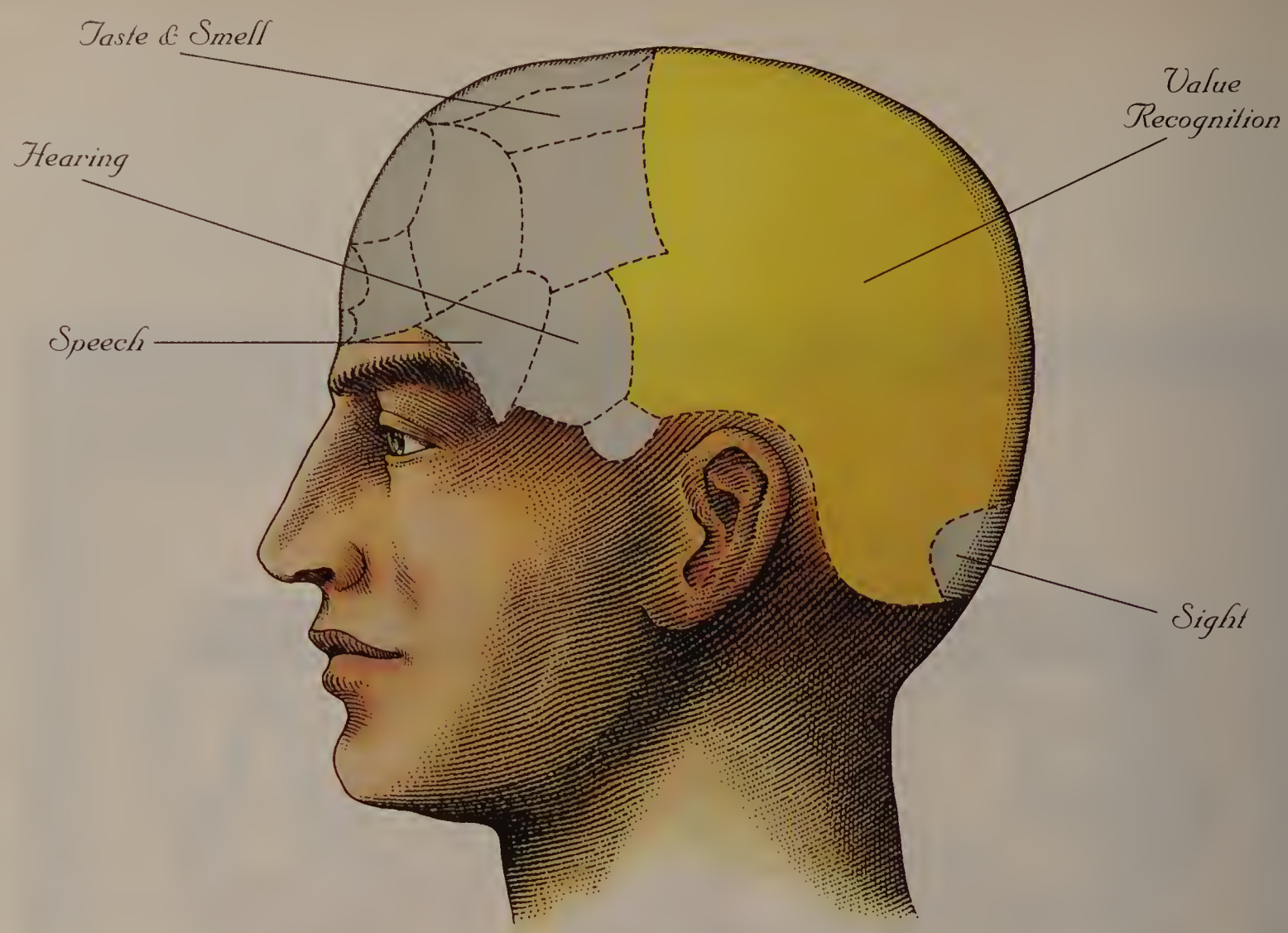

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Vektron International Closes Its Doors

IN JULY'S TOP 20 Power Desktops chart, *PC World* rated Vektron International's Super Power Station PII-300 at number 20. But readers who tried to order the system were told that the 800 number we provided had been disconnected. The reason? Vektron disappeared suddenly, shortly before the July issue hit the streets.

According to Richard Smith, a Vektron spokesperson, problems started when Vektron contracted with a Canadian company named Sidus to build, ship, and provide warranty service for PCs with the Vektron label. In April, Sidus pulled out of that contract. Vektron scrambled to line up another firm—Tatung—to handle the contract. But after filling only 20 percent of the orders that Vektron processed over a 60-day period, Tatung pulled out, too.

ILLUSTRATION: JOSEPH CIARDIELLO

Financially, that was the death knell for Vektron. According to Smith, the company refunded money to customers who'd paid cash for PCs they hadn't received. But it had no funds left for anything else. Meanwhile, Sidus still refuses to provide warranty service for Vektron systems. To date, Vektron has not filed for bankruptcy.

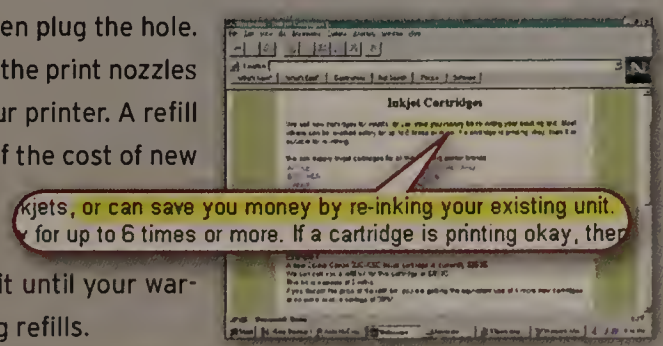
When I contacted Sidus, the company stated that it would prefer not to comment. And no one at Tatung was available for comment.

So if you own a Vektron PC, you'll have to find your own answers to technical questions and haul your PC to a local shop for any repairs. According to Smith, Vektron cannot even afford to sue Sidus to enforce the service contract. If you paid by credit card for a Vektron PC you never got, contact your credit card company immediately to dispute the charge.

THE FINE PRINT

REFILLING INK CARTRIDGES: WILL YOU BE SAFE OR SORRY?

THE CLAIMS MADE on the Web site shown here are true. You *can* save money by refilling your ink jet cartridge instead of replacing it with a new one. But the site doesn't tell you that doing so may damage your printer—and that this damage won't be covered by your warranty. When you buy a refill kit, according to Jill Kramer, brand manager for Hewlett-Packard's Ink Jet Supplies Business, you have to drill a small hole in the cartridge, inject ink into it with a syringe, and then plug the hole. In the process, you can easily damage the print nozzles or leave a small leak that will hurt your printer. A refill kit can save you 50 percent or more of the cost of new cartridges, but the minimum cost of repairing a printer damaged by one is $100 to $120, says HP. My advice: Wait until your warranty expires before considering using refills.



Dell Owners Speak Out

I'VE GOTTEN A LOT of mail in response to "Is Dell Living Up to Its Reputation?" in my July column. Some people shared horror stories of faulty systems and poor service. But lots of people wrote in defense of Dell, including Don Blaquiere of Fort Smith, Northwest Territories:

"I live in the Canadian subarctic. In January I bought a Dell Pentium. The PC arrived; then followed the month from hell. The problems were all software related, and for a month I nearly spent more time on the phone with Dell than I did at my office. The tech support people were patient and well trained. One guy even gave me his home e-mail address because he didn't want to leave me hanging.

"I called my Dell sales rep after one month. We reviewed my file. 'Not good,' she said. She offered me a full refund or system replacement. I ordered a Pentium II, and Dell provided a full rebate on my original purchase. It even credited me the cost of the original courier. I don't expect perfection, but I expect companies to make good on their products and promises. Dell support is everything the company says it is."

Vendor Flees in the Night

COMPUTER AMERICA, a memory and component supplier in San Clemente, California, has apparently abandoned its customers, location, and phone numbers. I've received numerous complaints from customers saying Computer America owes them money, goods, or both. Company phone numbers no longer work, though at press time the firm had not filed for bankruptcy. The owner of a neighboring business told me that the company simply packed up and left one night in mid-June. If Computer America owes you money, report your loss to the Better Business Bureau (www.bbb.com) and write to advocate@pcworld.com.

GOTTEN A RAW DEAL?

Or a great one? Send PCW Advocate *the details at advocate@pcworld.com. We'll investigate complaints and publish items of the broadest interest. Christina Wood is a contributing editor for* PC World. ■

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Windows 98—Without the Bugs

PROBLEM *You want Windows 98's troubleshooting features. You* don't *want its hassles.*

SOLUTION *Beef up Windows 95 with utilities that offer the same—or better—tools.*

PHOTOGRAPH: ROBERT HOLMGREN

WHY SPEND NEARLY a hundred bucks on an operating system upgrade that offers few real advantages and a rep for being buggy?

That's the question Alicia Celmer, president of ChannelWorks, a high-tech channel marketing consulting firm in Mountain View, California, asked herself when Windows 98 debuted this summer. She considered making the upgrade but quickly had second thoughts.

After the ballyhooed OS arrived, Celmer began reading about its incompatibilities and glitches (see *Bugs and Fixes,* September). And she realized that with Windows 95 OSR2 and Internet Explorer 4.0, she already had Windows 98's FAT32 support and browser integration. Celmer explains, "The advantages of Win 98 just weren't compelling enough for a small business like mine to go through the pain and expense of upgrading."

But what if, like Celmer's, your PC is prone to system crashes, and you have no IS department? Doesn't Windows 98 have new tools to help your system? Yes, indeed. Win 98's Maintenance Wizard combines three utilities—Disk Defragmenter, ScanDisk, and Disk Cleanup—that help launch applications faster, check for disk errors, and monitor your hard drive.

Still, you'd be wise to think again before making the Win 98 leap. Many third-party Win 95 utilities do the same things as the Maintenance Wizard (see "Windows Utilities: Rx for Your PC," June). Add the Windows 95 patches available free on the Web, and it's like having Windows 98 without actually having Windows 98.

ALTERNATIVE SYSTEM TOOLS

SYSTEM DOCTOR, part of Symantec's $79 Norton Utilities 3.0, is similar to Win 98's Maintenance Wizard. It automatically checks a hard drive for a variety of errors every time a PC is booted. When a problem is discovered, System Doctor prompts the appropriate Norton utility into action. If System Doctor discovers that the hard drive needs to be defragmented, for instance, it launches Speed Disk, Norton's excellent defragger. System Doctor also checks for viruses and ensures your rescue disk is up-to-date, two things Win 98 does not do.

Network Associates' $50 Nuts & Bolts, another popular maintenance suite, also includes utilities that make it easier to stay with Windows 95. Its Cleanup Wizard helps you get rid of temporary, Web cache, and other files, just as Win 98's Maintenance Wizard does. It also identifies orphaned DLL files, duplicate files, old bitmaps, and screen saver files so you can decide whether to delete them. And like Windows' ScanDisk, Nuts & Bolts' fast and efficient Disk Minder fixes hard drive errors; it also repairs corrupted boot sectors (ScanDisk doesn't).

MORE WIN 98 TOOLS DEBUNKED

AND THE LIST goes on. For just about every cool "new" Windows 98 utility, there's a Windows 95 equivalent:

Registry Checker: Windows 98's Registry Checker looks for—and solves—Registry conflicts each time Windows is started, and per- ▶

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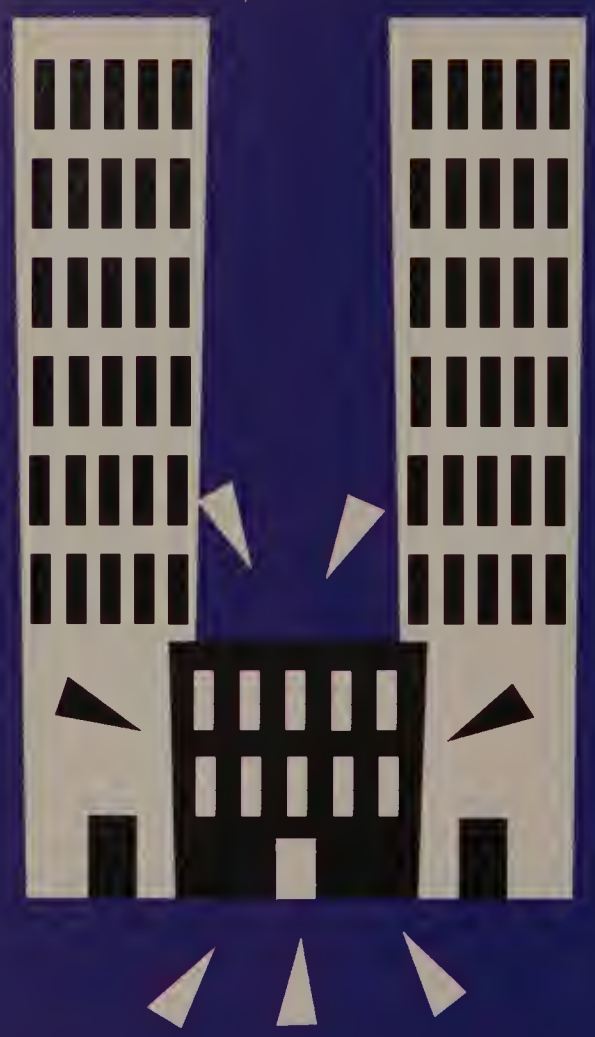

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forms daily Registry backups. If there's a system glitch, Win 98 reverts to one of its Registry backups.

Norton Utilities' WinDoctor is similar to Registry Checker, but it also checks for invalid Windows shortcuts and Registry entries. No Registry tool is perfect, but this one comes closest.

Crash Protection: Windows 98 still lacks the kind of crash protection a utility package has. Its Dr. Watson feature identifies software faults, collects detailed information on your system's state at the time the fault happened, and offers a diagnosis.

Norton Utilities' CrashGuard, however, focuses on saving your data. CrashGuard bypasses the location of a system crash, letting you save your file before you're forced to exit the application. Similarly, Nuts & Bolts' BombShelter allows you to recover a program that's crashed in order to save your data—even if you've entered the dreaded Windows "blue crash screen." But our favorite is CyberMedia's $60 First Aid 98 Deluxe, because it's the easiest to use and understand.

Online Updates: Another supposed benefit of Windows 98 is its ability to easily download and install the latest device drivers and software patches. But Windows Update is limited to Microsoft apps.

Few other update utilities are very good (see "No Easy Fixes," May). But at least you don't have to change operating systems to use them. The best one, CyberMedia's Oil Change ($40 per year), does the same thing as Windows Update, but for a broader range of software. Oil Change takes you to a database on the Net, examines your PC's drivers and apps, and downloads the updates you need.

BOTTOM LINE

UTILITY SUITES offer other advantages over the utilities found in Windows 98, including file managers that surpass Windows Explorer, and superior software uninstallers. Obviously, you'd want to settle on one suite—otherwise, you'd spend more on the utilities than on Win 98 itself. But with a utility package running under Windows 95, you have better system tools than those in Windows 98, while avoiding the hassle of upgrading.

And Alicia Celmer? She decided to save her upgrade dollars for Windows NT 5.0.

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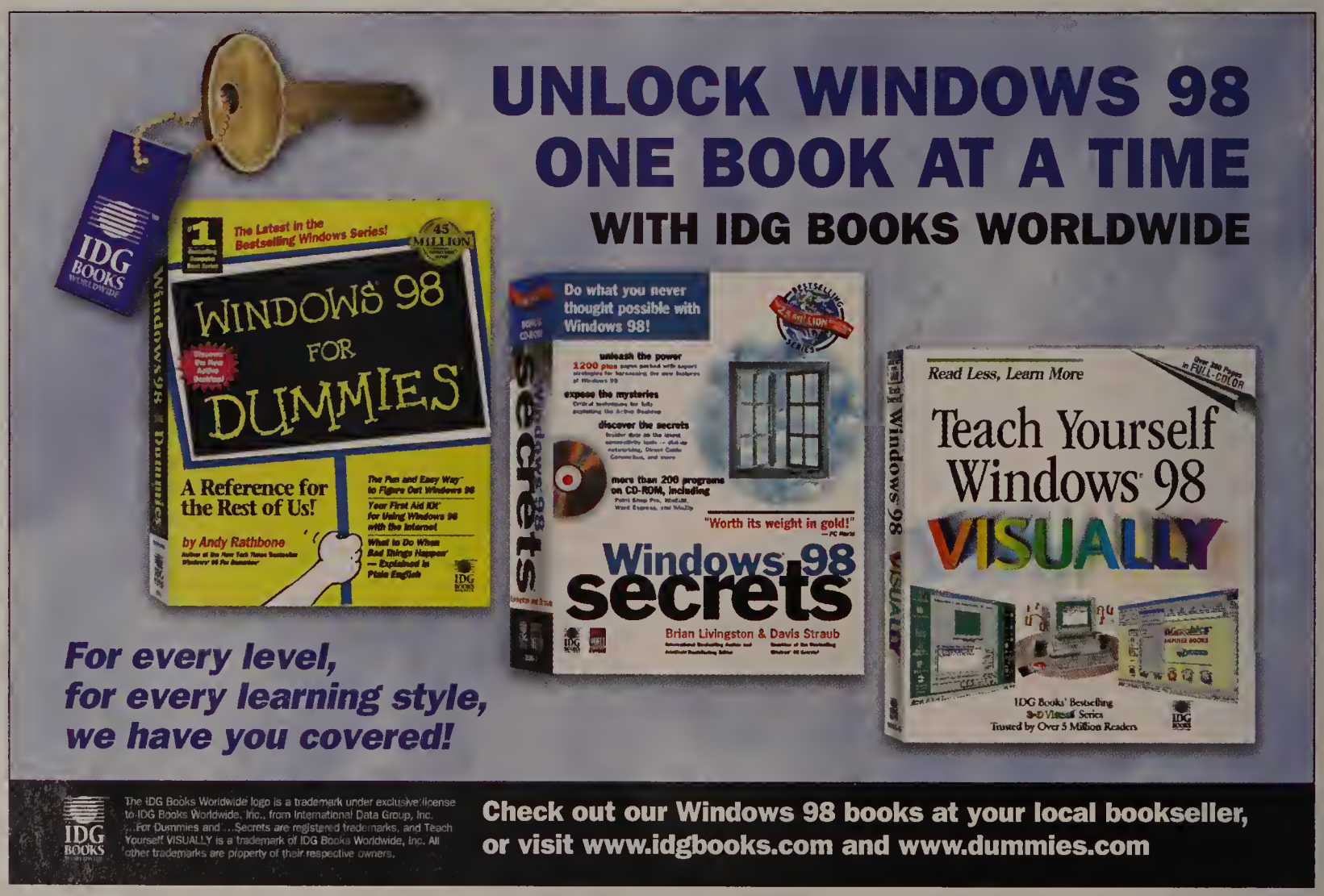
James A. Martin is a PC World *contributing editor. If you're having trouble resolving a PC-related hardware or software problem, we'd like to hear from you about it. See page 14 for contact information.* ■



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Major e-mail programs vulnerable ◆ Win 98 standby fixer ◆ Ditto drives do Win 98

You've Got Mail! (Boom)

WHEN IT COMES to protecting your PC, you have to know the rules. First, you shouldn't download and run programs from nonreputable sites. Second, data files can be lethal, too: Launching a Word or Excel file attached to an e-mail message might be the last thing you do before reformatting your drive.

Now comes the final cut. Security researchers recently discovered that just *receiving* a craftily concocted e-mail message can put you out of business. It turns out that unethical hackers can crash some versions of Microsoft and Netscape e-mail programs simply by sending you a message containing a file attachment with a very long file name. Worse, determined miscreants can embed program code in that long file name, and get it to run on your computer. If that rogue program's job is to delete your hard disk partition, you may not be checking your mail again soon.

The security flaw affects Windows 95 and 98 versions of Microsoft's Outlook 98 and Outlook Express 4.*x*, as well as Netscape's Communicator 4.0*x* and 4.5 suites. Earlier versions of Outlook and Outlook Express (as well as the Windows 3.1 version of Outlook Express 4.0), are unaffected, and other Internet mail programs—including Qualcomm's Eudora products and David Harris's Pegasus Mail—are immune.

Microsoft released patches for its affected mail programs within days of the flaw's discovery. You can find the 4.7MB patch for Outlook 98 at www.microsoft.com/outlook/enhancements/outptch2.asp. If you use Outlook Express, you must first upgrade to Internet Explorer 4.01 with Service Pack 1 (a 2.2MB download). The easiest way to do this is to open Internet Explorer 4.0 and choose *Help•Product Updates*, which will also install the Outlook Express patch. If you've already upgraded to IE 4.01, you can find a link to the 1MB Outlook Express patch at www.microsoft.com/ie/security/?/ie/security/oelong.htm.

At press time, Netscape was still working on an update to its Messenger mail program. The fix will be part of Communicator 4.06 and a later 4.5 beta, both of which should be available by the time you read this. To update your copy, choose *Help•Software Updates*. For more information, see home.netscape.com/products/security/resources/bugs/longfile.html.

Meanwhile, Qualcomm's Eudora Pro 4.0 and 4.0.1 got stung by a similar bug that allows wrongdoers to execute malicious Java programs on your computer by disguising them as Web page links. A 4.7MB version 4.0.2 update at eudora.qualcomm.com/pro_email/updaters.html closes the hole and fixes dozens of other bugs. See ftp://ftp.qualcomm.com/eudora/eudorapro/windows/english/updater402/README.txt for details.

Files from this article are available on PC World Online at www.fileworld.com. Scott Spanbauer is a contributing editor for PC World. ■

IN BRIEF

Ditto Max vs. Windows 98

IF YOU'VE HAD trouble using your Iomega Ditto Max tape backup drive under Windows 98, you're not alone. Iomega says that it's still working on compatibility testing and fixes (check out www.iomega.com/support/dittotech.html for details); the company suggests that in the meantime you skip installing the included FlashFile software. For other workarounds, see www.iomega.com/support/techs/pdf/98_flyer.pdf.

IntelliPoint 2.2

GOT SHPILKES in your IntelliMouse? Rumor has it that Microsoft's 1.2MB IntelliPoint 2.2 update (www.microsoft.com/msdownload/intellipoint/intellieng.asp) repairs glitches with the company's wheel mice under Windows 98.

Troubleshoot Windows 98 Power Problems

IF YOU READ last month's column, you know that laptop users have the hardest time upgrading to Windows 98. One common sticking point involves going into or out of standby mode. Fortunately, Microsoft has come up with a free tool that can locate and even fix the problem. The Power Management Trouble Shooter tool is already on your Windows 98 CD-ROM (look for pmtshoot.exe in the Tools\Mtsutil\Pmtshoot\ directory), but Microsoft recommends that you download a more up-to-date 158KB version from its Web site at ftp://ftp.microsoft.com/softlib/mslfiles/pmtshoot.exe.

After you've installed the utility, it will launch automatically whenever you start Windows 98. When you put your computer into (or resume from) standby mode, the Trouble Shooter identifies the program or driver that's causing the problem. The newer version of the program may even be able to resolve the problem for you. Once you're done tracking down the errors, uninstall the utility using Control Panel's Add/Remove Programs tab.

BUGGED?

FOUND A HARDWARE or software bug? Tell us about it via e-mail at bugs@pcworld.com.

ICON: JEFFREY PELO

PART #2425:

High-Caliber Notebook Reliability

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FUJITSU ACCESSORIES

STORY #158:

The Bullet Hole

IMAGINE you're sitting at your desk, minding your own business (which happens to be VP of sales for a toy manufacturer) when one of your guys comes back from the daily battlefield with a casualty. A Fujitsu LifeBook™ notebook, ripped clean through with anything but a plaything from your factory.

[*"A slug had pierced the LifeBook's case."*]

The screen and the pointer were shot, but just for fun you hook the system up to an external monitor and mouse. Push the "on" button. And raise your eyebrows. The LifeBook notebook had taken a hit, but luckily, no vital organs were damaged and it was still running. Of course, this sort of target practice doesn't happen every day. But we do put LifeBook notebooks through our own type of "warfare"; we call it our QA process. Heat, cold and drop tests. And then we open and close select hinges thousands of times.

[*"If I don't buy reliable notebooks, the next bullet's for me,"*]

700 Series
A powerful performer

600 Series
Redefining flexibility

might be the words you live by. We live by them, too. Built to withstand the daily grind of mobile computing, our notebooks deliver the leading-edge performance, human features, technical support and cost advantages you demand. Because it's not all fun and games out there—even if you happen to be in the toy business. So call us today and give the LifeBook notebook a shot. Just please, don't take that too literally.

900 Series
A desktop experience

There are millions of Fujitsu notebooks out there—each with a story of its own.

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Designed for Microsoft® Windows® 95

MMX™ intel inside pentium® PROCESSOR

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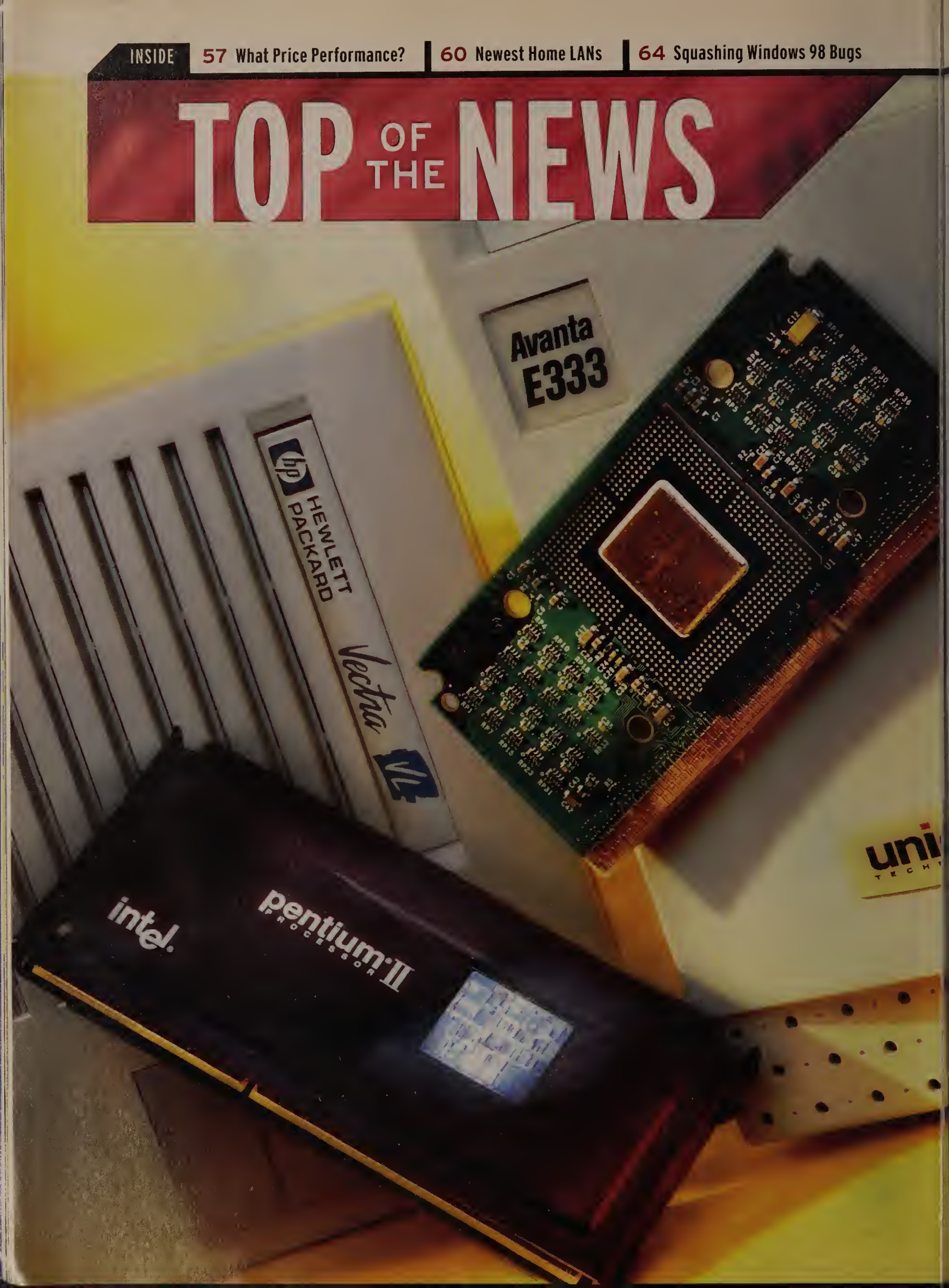
64 Squashing Windows 98 Bugs

TOP OF THE NEWS



Double Feature

Pentium II-450 PCs are the new **speed stars.** But Intel's revamped **Celeron-333** steals the show, with **great performance** for as little as $999.

◆ **By Lincoln Spector**

THE FASTEST Pentium II chip ever made! Again? Yes, Intel has created a new speed leader, the Pentium II-450. And it flies. The fastest of the four PII-450 machines tested for this article ran 9 percent faster than the average PII-400 on our PC WorldBench 98 tests. Still, that's not a huge change. The big surprise is Intel's other new arrival, the Celeron-333 chip: It runs like a Pentium II-333 but shows up in systems starting at just $999.

Why aren't we more excited about the PII-450 processor? If you buy a PII-450 system now instead of a PII-400, you'll spend $140 to $300 more for a PC that's not much faster on business apps. True, if you regularly do CPU-intensive work like image editing or desktop publishing and want every bit of speed you can get, the PII-450 prices aren't outrageous; the four systems we tested start at $2629. But for most power desktop shoppers, the PII-400s—at an average cost of $2414—make more sense. And PII-350 systems, averaging $2199, are good buys if you're looking for a midrange PC.

Speaking of good buys, Intel has improved on its first generation of low-cost Celeron chips. The earlier 266- and 300-MHz Celeron systems were slow and overpriced. But the new Celeron-333 is a price/performance winner, thanks to its built-in secondary cache, a crucial feature that the original Celerons lacked. Consider this: As recently as last May, before the PII-350 was introduced, the PII-333 was the fastest PC chip ever made; and the new Celeron-333 performs just as well as a PII-333.

INSIDE THE PII-450

UNLIKE THE PII-400, the PII-450 processor isn't a great leap forward. As you may recall, PII-400 and PII-350 systems wowed us when they debuted in May. Armed with the new BX chip set, these PII systems combined a swift processor with a fast 100-MHz system bus (compared to the previous 66-MHz bus) and speedy memory. The PII-450 uses that same 100-MHz bus and memory, and offers only a slight uptick in clock speed.

All four PII-450 systems we tested had 64MB of system RAM and 8MB of graphics memory. The $2675 Compaq Deskpro EP Model 6450 and $2890 HP Vectra VL Series 8 HE target corporate buyers. Dell's $2629 Dimension XPS R450 is designed for homes and small businesses, whereas the $2849 Gateway G6-450 is configured as a high-end home PC. (The Compaq and Gateway systems we looked at were shipping units; the HP and Dell PCs were preproduction units.) ▶

PHOTOGRAPHS: ROBERT OLDING; ICONS: JEFFREY PELO

JUST IN

Next Round of CPUs

IBM'S NEW silicon-on-insulator technology could yield fast, low-power CPUs by 1999. The technology insulates a chip's transistors, conserving energy and increasing speed. The chips are expected to appear in servers and mobile devices such as notebooks and cell phones. Meanwhile, the ship date for Intel's upcoming 64-bit CPU, codenamed Merced, slipped from late 1999 to mid-2000. This chip will handle more instructions per clock cycle than today's CPUs. If the schedule slips again, Intel may just skip Merced altogether and wait to offer its successor, McKinley, in the year 2001.

The 3D Web: Update

CHROMEFFECTS, a new Microsoft technology that lets a PC download and display 3D Web pages faster, is looking less like vaporware these days. Several vendors have announced plans to ship products that let developers add Chromeffects to their Web pages. In January, Template Graphics Software expects to ship a $49 FrontPage plug-in that can add Chromeffects to 3D art and animation. Later, Vertigo Technology, Hunt Interactive, Squishy FX, and Zapa Digital Arts will offer similar tools. To view the pages, Microsoft ▶

INTERNET

GET UP-TO-THE-MINUTE NEWS, including hot game demonstrations, the latest product reviews, and productivity shareware, at PC World Online. Just point your browser to www.pcworld.com/news.

DESKTOP PCs: BUSINESS APPS TEST REPORT

Watch Out, PII-333: Here Comes the Celeron!

SYSTEM	CPU	RAM (MB)	Secondary cache (KB)	PC WorldBench 98 score
HP Vectra VL Series 8 HE	Pentium II-450	64	512	216
Compaq Deskpro EP Model 6450	Pentium II-450	64	512	214
Gateway G6-450	Pentium II-450	64	512	213
Dell Dimension XPS R450	Pentium II-450	64	512	210
Compaq Deskpro EP Model C333	Celeron-333	64	128	176
Unicent Avanta E333	Celeron-333	64	128	171
Dell Dimension V333c	Celeron-333	64	128	169
Average of seven systems	Pentium II-400	64	512	198
Average of three systems	Pentium II-350	64	512	186
Average of two systems	Pentium II-333	64	512	172
One system	AMD K6-2-333	64	512	168
One system	AMD K6-2-300	64	512	166
One system	Cyrix M II-300	64	512	161
One system	AMD K6-300	64	512	145
One system	Celeron-300	64	0	115

Word 97 · Word Pro 97 · Excel 97 · 1-2-3 97 · Paradox 8.0 · Picture Publisher 7.0

TEST PC WORLD CENTER **HOW WE TEST** All systems are tested with PC WorldBench 98, PC World's application-based benchmark. A higher PC WorldBench 98 score is better. For more details on our benchmark and how we run it, see PC World Online (www.pcworld.com/testing). Data based on testing conducted by the PC World Test Center. All rights reserved.

Are these PCs worth the money? Based on our testing, today's business applications don't cry out for a PII-450. On average, the PII-450s performed only 8 percent faster than comparable PII-400s on our PC WorldBench 98 tests. The fastest PII-450, HP's Vectra VL Series 8 HE, ran 9 percent faster than the average PII-400—an unnoticeable tempo change in an application like Word or Excel. Among the four PII-450 system scores, we saw an insignificant 3 percent variation, from the HP's 216 to the Dell's 210.

Of course, if you spend a lot of time working with demanding, graphics-intensive programs, a PII-450 desktop with a top-notch graphics card may be the right choice. Almost no difference existed between PII-450 and PII-400 machines in our PowerPoint 97 test, which involves building a presentation. But on tougher graphics tasks, the HP and Compaq PII-450 PCs stood out.

In the Macromedia Director 6 test, where we play an AVI movie clip while running an animation in the foreground, the HP and Compaq systems achieved a rate of 99 frames per second—9 percent faster than the average PII-400 score of 91 fps. An improvement of this magnitude is observable in the playback: The faster the frame rate is, the smoother the animation looks.

One technical note: Due to certain conflicts between the Matrox Millennium G200 card, Microsoft DirectX, and Caligari TrueSpace3, we were unable to complete our TrueSpace3 test for the HP and Compaq machines. But these systems are quite capable of running the application.

Finally, the Compaq and HP PCs performed well with games. In our Redline Racer game test, for instance, the HP PII-450 outstripped our fastest PII-400 PC's score by 26 percent. But these results were due in large part to the impressive Millennium G200 graphics card that these machines use.

In contrast, the Gateway and the Dell PII-450s performed more on par with PII-400 machines on our graphics tests: Both are equipped with the STB Velocity 128zx graphics card, which couldn't equal the Millennium G200.

So if you want a PII-450 system, the Compaq and HP PCs offer the most graphics power. The Compaq costs $215 less than the HP and carries a larger hard drive, but the HP includes a LAN adapter card. The home-oriented Dell and Gateway units both include a DVD-ROM drive. The Dell costs $220 less than the Gateway, but it comes with a 17-inch monitor, compared to the Gateway's 19-incher. (For details, see the features chart, "PII-450s Come With All the Trimmings; Celerons Are a Bit Slimmer," on page 58.)

BIG BARGAINS

BUT MAYBE you don't need an expensive computer at all. With Intel's new, improved Celeron chip, bargain computers look better than they have in some time, particularly for people whose needs revolve around applications such as Word or Excel and a browser. And with prices dropping sharply, dumping

your PC when it becomes outdated—as it inevitably will—won't hurt as much.

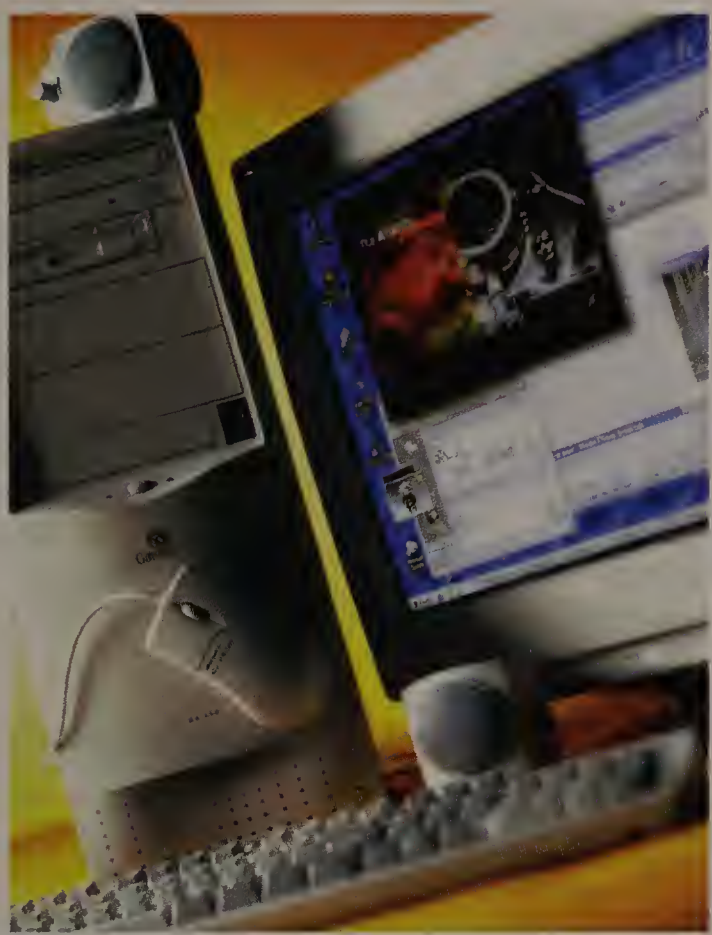
The original 266- and 300-MHz Celeron processors lacked a key feature of the Pentium II chip: a built-in secondary cache. As Dataquest analyst Nathan Brookwood puts it, Intel "saved $10 in cost of product and threw away 30 percent of the performance" when it made the original chips.

The new Celeron chips, code-named Mendocino, have a built-in 128KB secondary cache—and that's made a huge difference. In our tests, the Celeron-333 systems performed as well as PII-333 machines, despite the PII-333 chip's substantially larger, 512KB cache.

How is that possible? The PII-333's cache comes in the CPU package, but it isn't part of the chip and it operates at half the processor's speed. In contrast, the Celeron's cache is built into the chip and functions at full throttle.

Intel is making Mendocino chips in 300- and 333-MHz flavors. The 300-MHz chips are labeled Celeron-300A to differentiate them from the original, cacheless Celeron-300.

In our review, we concentrated on the Celeron-333s, testing shipping versions of Compaq's $1925 Deskpro EP Model C333, Dell's $1539 Dimension V333c, and Unicent's amazing bargain, the $999 Avanta E333. All of these come with a generous 64MB of RAM.



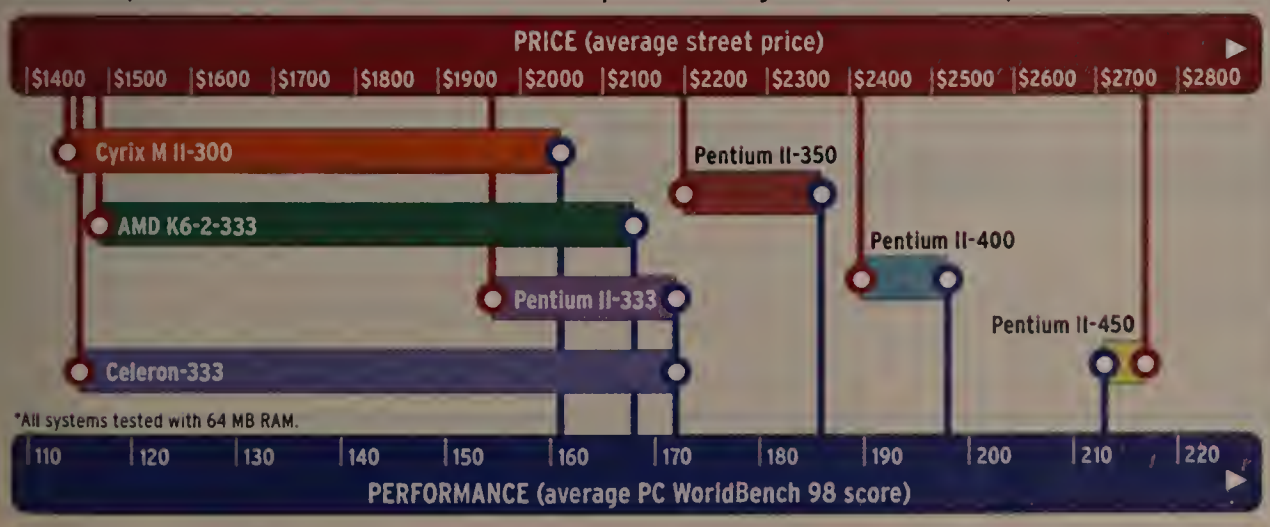
HOME COMPANION: Gateway's G6-450 offers a slew of goodies for home users, including a 19-inch display.

In our PC WorldBench 98 tests, the three systems posted an average performance score of 172, identical to the average score for PII-333 machines. By way of comparison, PII-400s earned a score of 198, on average. How much speed do you really need when you're working with business applications? Well, PII-333–level velocity seems awfully fast if you're accustomed to working with a Pentium-75. But you'll also notice the difference between a PII-450 or PII-400 and a Celeron-333, especially in tasks such as spell-checking large documents or recalculating huge spread- ▶

DESKTOP PCs — PRICE/PERFORMANCE

What Your Dollar Delivers

The chart shows the relationship between average system price (by CPU) and average performance. Other differences in system configuration are not represented.

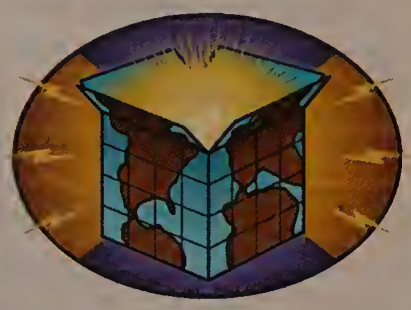


PHOTOGRAPH: ROBERT OLDING

recommends using at least a 300-MHz Pentium II with AGP graphics and Internet Explorer 4 or later. Chromeffects can't be viewed with current versions of Netscape Navigator.

New Mac Attack

APPLE'S translucent new IMac is getting lots of attention, and for $1299 it's certainly a good deal if you're a Mac type. But will it tempt budget-conscious PC buyers? It comes with a 233-MHz PowerPC G3 processor, 32MB of SDRAM, a 4GB hard disk, a CD-ROM drive, and a 56-kbps modem. It melds the CPU box and 15-inch monitor into a single unit that omits a floppy drive. We haven't tested the IMac yet, but it should rival a PII-300 in performance. In contrast, Micro Express's MicroFlex-F300G, a PII-300-based PC, costs $1299 and offers twice the RAM, two more gigs of hard drive space, a 17-inch monitor, and a floppy drive.



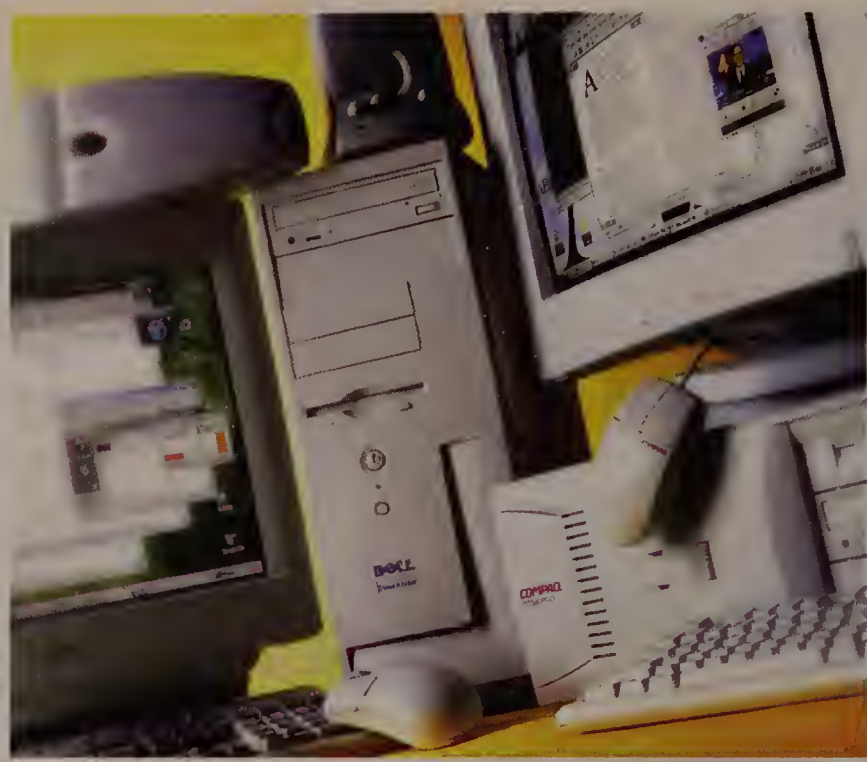
TidBytes

Blazing Graphics: STB's $199 Velocity 4400 will be the first graphics card to use Nvidia's new Riva TNT chip. The chip is expected to boost graphics packages and games. **E-Mail by Phone:** Planetary Motion's new CoolMail (www.planetarymotion.com) will let you hear—and reply to—e-mail messages by telephone. After you hear advertisements, the service reads e-mail and lets you reply by sending a preset text response or voice attachment or by dictating a message that the service translates into text.

sheets. One big reason: Like everything before the PII-350, the Celeron still chugs along on a 66-MHz system bus.

Still, the Celerons performed fairly well on our graphics tests. They do basic graphics chores like PowerPoint presentations without breaking a sweat. Of the three Celeron systems, the Dell has the most graphics horsepower; it aced our Caligari TrueSpace3 test thanks to its integrated ATI Rage Pro Turbo chip with 8MB of SDRAM. This chip handles AGP texturing, as does Unicent's ATI 3D Rage Pro, which has 4MB of SGRAM. That allows better visual quality in some apps, compared to the Matrox Millennium G100 card with 4MB of SGRAM.

Which Celeron-333 is best? The $999 Unicent (with a 15-inch monitor) is the sweetest deal. Even if you upgrade its monitor and hard drive to match the Dell's specs, this PC costs $540 less. But you can't upgrade its 4MB of SGRAM. Given its graphics advantage and 17-inch monitor, the Dell is a tempting deal from a big-league vendor. The Compaq, meanwhile, seems overpriced.



LEFT: Dell's $1539 Dimension V333c is an inexpensive, loaded Celeron-333 PC. RIGHT: Compaq's $1925 Deskpro EP Model C333 seems pricey.

GOODBYE PII-333?

WITHOUT A DOUBT, the Celeron-333 chip will shake up the budget PC market. Will it make the PII-333 redundant? Intel will continue to make the PII-333 chip, but most people won't want the machines powered by it. Some corporations, on the other hand, buy only Pentium II systems and will continue to do so for simplicity's sake, notes Mercury Research analyst Dean McCarron.

Intel charges system makers $124 more for a PII-333 chip than for a Celeron-333, and this differential will show up in PC prices. Many PC lines, such as the Dell Dimension series, won't include a PII-333 model this fall; vendors will skip from the PII-350 processor to the Celeron-333. Dell may add a PII-333 later, however.

Not all bargain PCs have Intel inside, of course. AMD and Cyrix make their own low-cost CPUs—the K6-2-333 and the M II-333, respectively. And in the past, these have powered systems priced $250 less than comparable Pentium IIs. Because the Celeron-333 threatens AMD's and Cyrix's market shares, these vendors will have to cut their CPU prices; system prices may fall to just below Celeron-333 PC prices.

INVESTMENT PLANNING

A CELERON-333 PC can handle today's standard business applications without any difficulty. But how will it measure up to the demands of tomorrow's programs? Two CPU-intensive technologies on the horizon are worth watching if you're looking for a new PC.

As voice recognition technology continues to improve, many industry observers expect it to

DESKTOP SYSTEMS — FEATURES

PII-450s Come With All the Trimmings; Celerons Are a Bit Slimmer

PENTIUM II-450 SYSTEM	Street price	Monitor size (inches)	Hard drive (GB)/rpm	DVD-ROM drive	Graphics adapter	Additional features	InfoNet number
Compaq Deskpro EP Model 6450 800/345-1518 www.compaq.com	$2675	17	14.4/7200	○	Matrox Millennium G200	internal Zip drive	769
Dell Dimension XPS R450 800/388-8542 www.dell.com	$2629	17	10.1/7200	●	STB Velocity 12Bzx	Altec Lansing ACS295 speakers with subwoofer, internal Zip drive	770
Gateway G6-450 800/846-2000 www.gateway.com	$2849	19	14.4/7200	●	STB Velocity 12Bzx	Boston Acoustics 635 speakers with subwoofer	771
Hewlett-Packard Vectra Series 8 HE 800/839-6854 www.hp.com	$2890	17	10.1/7200	○	Matrox Millennium G200	Multimedia programmable keyboard, 3Com 10/100 LAN card	772
CELERON-333 SYSTEM							
Compaq Deskpro EP Model C333 800/345-1518 www.compaq.com	$1925	17	10.1/7200	○	Matrox Millennium G100	–	773
Dell Dimension V333c 800/388-8542 www.dell.com	$1539	17	6.4/5400	○	integrated ATI Rage Pro Turbo	Harmon Kardon 195 speakers	774
Unicent Avanta E333 800/628-4888 www.unicent.com	$999	15	4.3/5400	○	integrated ATI 3D Rage Pro	Altec Lansing ACS90 speakers	775

● Yes ○ No

All systems have 64MB of system RAM. PII-450 systems have a 512KB secondary cache and an AGP graphics card with 8MB of SGRAM. Celeron-333 systems have a 128KB secondary cache and an AGP graphics adapter or integrated chip: Dell includes 8MB of SDRAM; Compaq and Unicent include 4MB of SGRAM.

PHOTOGRAPH: ROBERT OLDING

Playing Games? These New 450s Are the Right Choice

SYSTEM	CPU	Graphics memory (MB)	Presentation test (seconds)	Playback tests (frames per second)			
Compaq Deskpro EP Model 6450	PII-450	8	162	99	46	54	n/a
Dell Dimension XPS R450	PII-450	8	156	92	43	51	40
Gateway G6-450	PII-450	8	155	94	39	48	40
HP Vectra VL Series 8 HE	PII-450	8	160	99	54	57	n/a
Compaq Deskpro EP Model C333	Celeron-333	4	167	83	28	27	n/a
Dell Dimension V333c	Celeron-333	8	171	85	34	n/a	31
Unicent Avanta E333	Celeron-333	4	173	84	33	n/a	22
Average of six systems	PII-400	8	160	91	39	46	37
One system	PII-333	4	174	85	31	n/a	20
One system	K6-2-333	8	167	77	30	27	23
			◀ Faster Slower ▶	◀ Slower			Faster ▶

PowerPoint 97 · Director 6 · Redline Racer · Turok Dinosaur Hunter · TrueSpace3 · n/a = not applicable

TEST PC WORLD CENTER **HOW WE TEST** In Microsoft PowerPoint 97, we time a script that builds a 50-slide presentation; faster times are better. Using Microsoft Active Movie, we play back a looping AVI clip while running an animation in the foreground. We also execute self-running demos in Criterion Redline Racer and Acclaim Turok Dinosaur Hunter. In Caligari TrueSpace3, a 3D modeling program, we play back a tutorial that uses AGP textures. For all four playback tests, faster frame rates are better. Tested applications do not make use of AMD's 3DNow technology. All systems tested with 64MB of system RAM. Celeron-333 machines tested with 128KB secondary cache; all others with 512KB. Incomplete results in TrueSpace3 and Turok are due to a test task incompatibility with particular applications, Microsoft DirectX, and graphics card drivers; the systems will run the applications.

become the "next big thing" in software interfaces. Today's voice recognition programs do function adequately on a Pentium-MMX machine, but they run faster and more accurately on a Pentium II–class PC.

That situation is likely to remain true when future applications that use voice commands emerge: The higher the processor speed, the better the performance.

The second technological area to watch is 3D graphics, where apps usually benefit from fast systems.

A final note about the Celeron-333s: If you plan to replace your system's CPU, note that the Celeron-333 is hobbled by its 66-MHz system bus. You can pop in a future Celeron chip (Intel has plans to release a 366-MHz version in the first quarter of 1999), but you won't be able to add future Pentium II chips. If you don't like this limitation, buy a PII-350 PC or better with the 100-MHz system bus and confirm with the vendor that it has no potential BIOS problems.

> With Intel's new, **improved Celeron** chip, **bargain PCs** look better than they have in a while for people who mainly work with **Office-type apps.**

If you're pondering splurging on a Pentium II-450 speed king, be aware that this CPU won't wear the royal crown for long. Scheduled to arrive between January and March 1999, a 500-MHz chip based on the Pentium II core is expected to debut an instruction set, code-named Katmai, that improves handling of 3D tasks.

As with MMX, the Katmai instruction set will enhance the performance of software designed to take advantage of it—but nothing else. Based on the MMX software experience, we'd expect enhanced apps to appear slowly.

Today, the PII-450 chip runs the fastest mainstream business PCs you can buy. If you want every bit of performance currently obtainable, a PII-450 with an excellent graphics card may be worth the expense. Otherwise, save yourself several hundred bucks by picking a PII-400 that's almost as fast. PII-400 machines average $2414; the least expensive of these sell for less than $2000.

BEST DEALS NOW

IF YOU OPT FOR a Celeron-333 machine, you'll get a budget PC that is no wimp. The $999 Unicent and $1539 Dell Celeron-333 systems make sensible choices for productivity apps and routine graphics programs at work or at home. These systems strike a smart balance between a low price and fast performance.

It hasn't escaped our attention that any one of these Celeron-333 PCs would have been dubbed lightning fast just five months ago. Fame is fleeting in the fastest-CPU contest. A good PC value is much more satisfying. ▶

LAN of the Brave? Home Networks Not for Dummies

FIRST WE HAD the two-car garage, and now we have the two-PC family: According to Forrester Research, 14 million American households own more than one PC. And any place with more than one PC is a network waiting to happen. That's why vendors are introducing products for networking home computers. The idea is that multi-PC families want to share printers and access to the Internet. But to make that happen, vendors must first make networking—a notoriously thorny technology—easy enough for the average PC user to set up.

In April, we looked at one of the first home networking products, Intelogis's $250 PassPort Plug-In Network kit, which uses the AC wiring in your walls to create a LAN. PassPort is easy to install—you plug an adapter into a wall outlet and connect the adapter to your parallel port—but it's slow. Now a second wave of home networking products is hitting store shelves. If our first looks at kits from 3Com, NovaWeb, and Proxim are a fair gauge, the pendulum has swung the other way: Performance is better, but installation has grown more nettlesome.

But help may be on the way. Industry heavyweights Intel and Compaq have helped form the Home Phoneline Networking Alliance. The group is backing a new technology that uses the existing phone wires in a house to connect home PCs; this approach to networking could improve both performance and installation.

NETWORK, NOT WORK

BOTH NOVAWEB AND 3Com base their products on traditional 10BaseT ethernet technology. We checked a shipping version of 3Com's OfficeConnect Networking Kit ($119 list), which includes a four-port external hub, two network interface cards, and cables. We also tested a beta version of NovaWeb2001 ($299 list), consisting of a four-port ISA hub with integrated V.90 modem, an NIC, and cables.

Proxim's Symphony line of wireless home networking devices connect PCs and peripherals via 2.4-GHz radio waves. The products include an ISA card for desktops ($149 list), a PC Card for portables ($199 list), and a wireless modem that hooks all of them up to the Internet ($299 list). We looked at beta versions of the ISA cards and modem. (Diamond Multimedia has its own wireless home networking product on the way, but it was not available in time for us to try it out.)

We installed each unit on three different PC configurations. First, we tried the products on a couple of old 75- and 100-MHz Gateway Pentiums running Windows 95; then on two freshly formatted Quantex PII-300 systems with a Windows 95 operating system; and finally on the same Quantexes running Windows 98.

Compared to the PassPort kit, the new products were bears to install. We began by opening each PC and plugging the NIC into a slot. Windows 95's Plug and Play usually recognized the cards, but problems soon arose. Installing the Proxim card in one old Gateway, for example, disabled the PC's CD-ROM drive. When we reset the IRQs manually, the problem disappeared. Windows 98, on the other hand, had trouble finding the right drivers during its hardware detection routines; we eventually opted to install them manually. (None of the products claim to support Windows 98 yet; we tested it anyway, to see if people with new PCs have any viable options.)

PLUG, NO PLAY

THE SERIOUS problems occurred after the hardware was in place, when we tried to get the sys- ▶

HOME NETWORKS TECHNOLOGIES

Phone Lines May Take the Pain out of Home Networking

TECHNOLOGY	Speed	Typical price per node	Pros	Cons
AC power	350 kbps	$100	Uses existing home electrical wiring, easy to set up.	Slow.
Wireless	1.6 mbps	$150	Requires no unsightly cables, good for notebook users who want to roam the house.	Relatively expensive, distance constraints, tricky to set up.
Phone line	1-10 mbps [1]	$100	Uses existing home phone wiring, potentially fast and easy to set up.	Unproven, not shipping yet.
10BaseT network cable	10-100 mbps	$50-$125	Fast, relatively cheap, proven technology.	Requires new cables and hub, tricky to set up.

[1] 10 mbps next year.

ILLUSTRATION: MARK MATCHO

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PROXIM'S SYMPHONY LINE of wireless home networking products includes an ISA card, a PC Card for portables, and a modem.

tems to behave like a network. All three kits come with software that's intended to help you configure the network, but these utilities didn't help us much. To get the products to work, we typically had to manually adjust or reinstall hardware, software, or even Windows itself. And too often even that wasn't sufficient. OfficeConnect worked on the old Gateways, but we couldn't get it to run on the Quantexes. The NovaWeb and Proxim kits worked only on the Quantex systems running Windows 95. None of the products we looked at worked with Windows 98.

GOOD SPEED

WHY DID OUR Plug and Play networks turn on us? To start with, network cards are notoriously finicky about the PCs and configurations in which they'll work. NovaWeb's Ron Lambert implicated Windows' Network Neighborhood utility. "[It] isn't the most accurate [program] in the world," he said. "You can disconnect a computer from the network and Network Neighborhood will still think it's connected." In addition, the versions of NovaWeb and Proxim we tested were prerelease; according to the vendors, the problems we had might be resolved in the shipping versions.

When we did get the new products to work, they did the job swiftly, though not as fast as their rated speeds would indicate. OfficeConnect, which has a rated speed of 10 megabits per second, transferred a 5.6MB file from one old Pentium to another in roughly 14 seconds; sending the same file via NovaWeb between the PII-300s took about 10 seconds. Wireless, on the other hand, is much slower. The 1.6-mbps–rated Proxim boards took more than 2 minutes on average to transmit the 5.6MB file between the Quantex PCs; and Intelogis's PassPort, rated at 350 kbps, took more than 5 minutes to do the same thing.

How fast is fast enough? Intel says that for basic home applications—sharing a printer and a modem, for instance, or supporting multiplayer gaming—1 mbps can do the job just fine. But as faster Internet technologies such as cable and DSL reach the market, consumers may not be be satisfied with that level of performance for long.

UP AND COMING

PHONE LINES CAN handle 1 mbps and more already. The HPNA has endorsed a 1-mbps spec—dubbed HomeRun—developed by Tut Systems. You can expect to see $100 add-in cards based on Tut's technology by the end of the year; later, you may see HomeRun embedded in motherboards. The HPNA has also endorsed a 10-mbps spec—fast enough to transmit TV signals to every PC in the house—created by Epigram. These 10-mbps products won't hit the stores until the middle of 1999 at the earliest. Interval Research has announced its own phone line technology, MediaWire; it isn't compliant with the HPNA specs, but it promises to connect PCs and home entertainment devices at speeds of up to 44 mbps. Because of phone line technology's speed and potential ease of use, analysts regard it as the home networking technology of choice.

Help is also on the way from Microsoft. MS product manager Ron Cully says Windows NT 5.0 (expected to ship sometime next year) will include networking wizards that will make proprietary installation utilities unnecessary.

HERE AND NOW

WE'LL BELIEVE it when we see it. For now, if you want a home network, thorns and all, you do have options. If your needs are simple—say, connecting two PCs to a printer in the same room—a printer-sharing device is adequate. To share a printer in one room with a PC in another room, consider Intelogis's PassPort. For connecting PCs and peripherals in the same room, the 10BaseT products are worth a look. But most people should wait for the first phone line products, which promise easier setup and higher performance.

—Dan Miller ▶

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Bugged by Windows 98? Glitches Are Driving Users up the Wall

CONSUMER ALERT

MICROSOFT SAYS Windows 98 "works better and plays better." But don't tell that to Danielle Scott of Toronto. When the 23-year-old office supplies store clerk tried to install the Windows 98 upgrade on her 200-MHz Pentium, the software crashed during setup. "A lot of my files were corrupted; I couldn't use my programs or e-mail. I was paralyzed," she states. It took her two days to recover her data.

Scott's nightmarish installation is far from an isolated incident. Internet newsgroups are littered with first-person accounts of Win 98 bugs and glitches: malfunctioning notebook power management; printers, software, and drives that don't work; and even systems that won't boot. As if these problems weren't enough, Windows Update, a new Windows 98 feature intended to help users avoid problems, may make them worse.

Microsoft, which doesn't provide a toll-free help line, says Windows 98 is safe and stable. "The operating system isn't broken," says Shawn Sanford, a Windows 98 product manager. "The volume of Windows 98 copies shipping is very high, and there are going to be issues."

Microsoft points to a survey conducted by market research firm Telecommunications Research Group showing that nine of ten Windows 98 home users are satisfied with the OS. But Microsoft sold more than a million upgrade copies of the new OS within a month of its release. So the 90 percent approval rating means that 10 percent—or at least 100,000 users—aren't happy at all.

Even computer manufacturers, which in most instances march in lockstep with Microsoft, are posting upgrade warnings on their Web sites. Top vendors such as Compaq, Dell, Gateway, and IBM are telling customers to download BIOS and driver upgrades *before* they install Windows 98. And Dell strongly discourages its customers from using Windows Update, which automatically downloads and installs updated OS files from the Microsoft site.

The software giant's take on the situation? Windows 98's problems are minor and mostly due to drivers that didn't make it on the upgrade CD-ROM. And while some notebooks can't take advantage of Windows 98's new power management features without a BIOS update, those updates are (or soon will be) available via the Web. As for Windows Update, Microsoft acknowledges that it still has some "hiccups" to work out with hardware makers but adds that the core technology itself is sound. "The premise of the technology is great—a central place where you can get updates for your operating system," insists Microsoft's Sanford.

> Windows 98 was supposed to have a huge supply of updated drivers, so I was floored that it didn't recognize mine.

Sanford may be right. But why do so many people have trouble upgrading? Why were so many drivers left off the upgrade CD? And why didn't Microsoft collaborate earlier with hardware vendors to ensure that notebook BIOSes would be ready for Win 98?

MISSING DRIVERS

MOST USER problems involve hardware peripherals—scanners, printers, tape drives, and so on—that worked perfectly under Win 95 but won't function post-upgrade. George Kalas, a Webmaster in Houston, installed Win 98 on his 120-MHz Pentium PC clone and quickly discovered that his Iomega Ditto tape drive would no longer work. Then Kalas unsuccessfully searched the Iomega and Microsoft sites for answers. "Windows 98 was supposed to have a huge supply of updated drivers, so I'm floored that it didn't recognize this drive," he says.

Why the missing drivers? Though the Win 98 CD contains more than 1200 drivers, it leaves out many glitches. If you're using a Turtle Beach Montego 64 sound card in your Dell Dimension PC, for instance, you'll need to download the appropriate Win 98 driver from Dell's Web site. And you'll need to scan the Web for drivers for many other peripherals, too, including the Bay Networks FA310TX network card.

"If this were a perfect world, we would continually add drivers to the CD," concedes Sanford. "But we have to freeze the code at some point. If we kept adding drivers, we'd never release a product."

HARDWARE NOT READY

IN SOME INSTANCES, today's hardware simply isn't ready for Windows 98's new features. Many notebooks need an updated BIOS—the basic instructions for controlling hardware—to take advantage of Windows 98's Advanced Configuration and Power Interface feature, which allows a PC to conserve power by turning off specific peripherals. The Toshiba Web site, for ▶

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example, warns of "significant difficulties" in installing the company's ACPI-compatible BIOS after its notebooks were upgraded to Windows 98. The notebooks still function, but can't use certain new power management features.

Other notebook peripherals require BIOS upgrades, too. If, for instance, you want your PC Card modem (or other device that uses the credit card–size slot) to work on your Gateway Solo 9100, you must update the BIOS before moving to Windows 98.

Who or what is to blame? "Most hardware vendors are still testing their ACPI-compliant BIOS," says Sanford. "Windows 98 is the first operating system that supports ACPI, and somebody has to lead the way, whether it's the hardware or software vendor."

But in the case of ACPI, it seemed only recently that no one was leading the way. Windows 98 was in beta for well over a year—plenty of time for notebook vendors to prepare their systems for the new OS. So when Windows 98 shipped unexpectedly with the interface in June, many vendors were caught off-guard.

Some industry watchers believe Microsoft is to blame. "I don't think the problems can be laid totally at the hardware guys' feet," says Dataquest software analyst Chris LeTocq. He says that in 1997 Dataquest advised Microsoft to develop a "98-ready" program that would spur hardware vendors to prime their machines for the arrival of Windows 98. "But [Microsoft] never did that," LeTocq says.

George Kalas of Houston spent weeks looking for the Win 98 drivers he needed.

HELP—WHERE?

BOTH MICROSOFT and hardware vendors have posted a number of Windows 98 drivers and upgrade tips on their Web sites. Nonetheless, some users feel that this information is too hard to find. "Neither the Microsoft nor the Iomega site was of any help at all," says user Kalas, who combed the Web fruitlessly for a timely solution to his nonfunctioning Ditto tape drive. (Six weeks later, Iomega provided a fix for the problem.)

Indeed, obtaining Win 98 troubleshooting information on the Web often seems like collecting lost dollar bills on Manhattan sidewalks. Despite the many reports of upgrade problems, the home pages of Compaq, Dell, Gateway, IBM, and Microsoft offer no direct links to a Windows 98 help page. (On the other hand, the "official" Microsoft Win 98 page, at www.windows.com/windows98, does provide a link to upgrade tips.)

By the time you read this, Microsoft should already have released its Multimedia Update, which will fix at least some of the known bugs and add a number of multimedia enhancements to Win 98.

And those Win 98 upgrade problems? "We don't want to play down people's issues, but we're actually getting fewer support calls" than after other OS launches, Sanford says.

Is upgrading to Windows 98 safe? The answer is yes, as long as you take a few precautionary steps in advance. First, call your PC vendor or check its Web site for updated driver and BIOS files. Next, back up your data and be sure to select the install option that lets you keep Windows 95 files on your hard drive. And don't forget to cross your fingers.

—Jeff Bertolucci

Additional reporting was done by Yardena Arar. ▶

WIN 98 INCOMPATIBILITIES

Got Bugs? Windows 98 Glitches and How to Fix Them

PRODUCT	Problem	Solution
Bay Networks FA310TX LAN www.baynetworks.com	PC can't access network.	Download updated driver from Bay Networks site.
Compaq Presario (all units) www.compaq.com	CD-ROM drive doesn't work in DOS mode.	Remove 'rem-By Windows Setup-' from config.sys file.
Dell Dimension XPS R400 www.dell.com	Modem and sound card malfunction.	Download updated drivers from Dell site.
Gateway Solo 9100 www.gateway.com	PC Cards don't work.	Download updated BIOS from Gateway site.
HP OfficeJet 1150C www.hp.com	Crashes, error messages.	Download updated driver from HP site.
IBM ThinkPad 770E www.pc.ibm.com	No infrared file transfer.	Puma Intellisync 97 or Win 98 IR software.
Logitech MouseWare 7.2 www.logitech.com	Unprogrammable mouse buttons.	Download updated driver from Logitech site.
Norton Utilities 3.0 www.symantec.com	Inaccurate disk frag report.	Download NU 3.0 patch from Symantec site.
Quarterdeck CleanSweep 4.0 www.qdeck.com	File-deletion protection doesn't work.	Install version 4.02 patch.
Toshiba 550CDT www.toshiba.com	ACPI power management doesn't work.	Download updated BIOS from Toshiba site *before* upgrading.

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Lawmakers to Consumers: Tough Luck!

ANALYSIS

YOU DOWNLOAD a hot new piece of software, open it up, and kablooie! Your system crashes, the program won't run, and your data has been corrupted. Or maybe your PC has been infected with a virus. But when you complain, the software vendor says that, by accepting the terms under which you were permitted to install the package, you've released it from liability.

Can vendors get away with this? You bet, and a proposed model law for governing software as well as contracts in the digital domain in general may carry on the tradition. It's called Article 2B, an extension of the Uniform Commercial Code that's been in the works for three years. One of the two groups of volunteer lawyers responsible for drafting 2B recently met with industry and consumer groups to strike a better balance between the interests of vendors and their customers. The upshot: Consumers gained some ground, but concerns about the draft persist—and 2B could become law in the year 2000.

The UCC—the bible for state laws regulating business transactions throughout the U.S.—is a joint project of the National Conference of Commissioners on Uniform State Laws and the American Law Institute. The drafters of 2B are trying to develop laws to fill a legal vacuum relating to the buying and selling of digitized information. The controversy lies in the language of this near-300-page tome, which favors vendors over customers. The rising tide of consumer complaints has already prompted the drafters to delay promulgation of 2B for a year; NCCUSL and ALI now expect to finalize the wording of 2B in 1999, and they plan to present it to state legislatures early in 2000.

ANTICONSUMER?

WHY ALL THE FUSS? To start with, Article 2B validates the existing concept of shrink-wrap licenses (those throw-away contracts inside the product box) and so-called click-wrap licenses (those stupor-inducing, hardly-ever-read "I agree" online contracts). When you purchase software, you buy only the right to use it; the vendor dictates the terms of use. In the opening example, the vendor included a product warranty disclaimer—a common industry practice.

Under the proposed standards of 2B, if you don't like the terms of the contract, you can get a refund and recover "incidental damages" such as shipping expenses. But if the software damages your data, you could be out of luck. You can sue, certainly, but forget about small claims court. In all likelihood, the vendor has specified where and under what law you can seek redress. Vendors may even profit from their mistakes; 2B contains no provision forcing them to reimburse you for tech support. Of course, most reputable vendors will take care of you. But there's no guarantee.

THAT'S BETTER

DRAFTERS HAVE offered various compromises in 2B, but consumer advocates contend that many of these supposed protections are riddled with loopholes. Moreover, none of the proposals on the consumer side have been accepted by the drafters, says Cem Kaner, an attorney and vocal 2B opponent. For example, one early draft would have held vendors accountable for viruses, but that provision was dropped due to industry opposition.

At the recent annual meeting of NCCUSL, commissioners passed a motion that—if preserved—would beef up consumer protections. The motion proposes barring licensing terms that contravene public policy, including clauses of Article 2B that restrict free expression, such as one notorious provision that would prohibit consumers from criticizing a vendor's product. If such anticriticism clauses ever became law, magazines might not be able to publish negative product reviews.

Consumers groups are encouraged by the recently proposed changes. But drafters are free to alter the language and may water it down. Furthermore, the software industry has objected to the proposed changes. And without industry support, 2B will die, says Mark Nebergall, vice president and counsel for the Software Publishers Association.

Ultimately, Article 2B could still have a negative impact on consumers. Better to speak up now than to suffer the indignities of biased legislation later.

—Jane Morrissey ▶

Bad Laws? Just Say No

◆ **www.SoftwareIndustry.org/issues/guide**
Register for 2B updates via e-mail, and post comments for lawmakers.

◆ **www.badsoftware.com/uccindex.htm**
Lawyer Cem Kaner's site discusses 2B's consequences for consumers.

◆ **www.cptech.org/ucc/ucc.html**
2B protest page from Ralph Nader's Consumer Project on Technology.

ILLUSTRATION: MARK MATCHO

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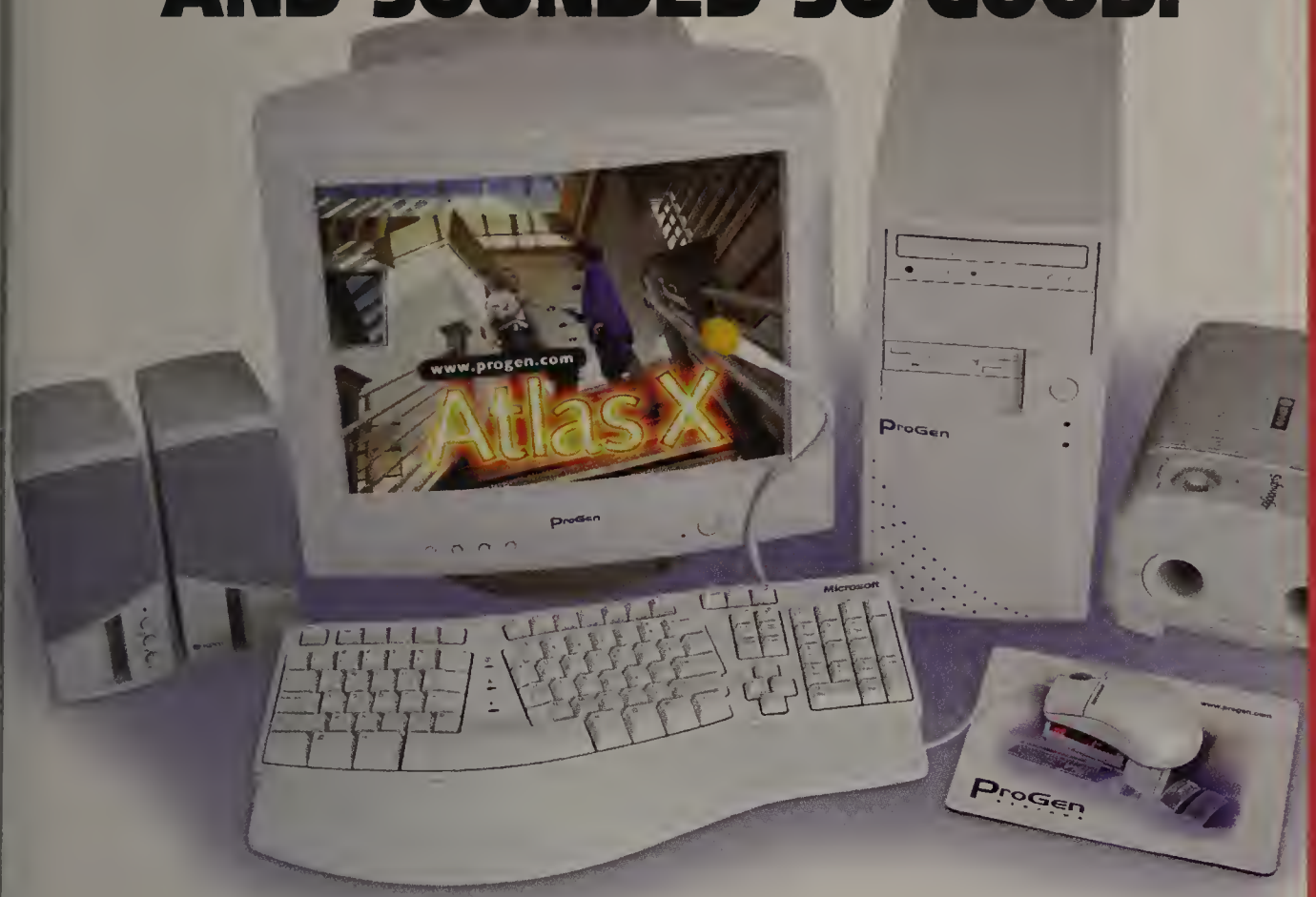

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Chat Software Gets Serious, Goes to Work

IF YOU THINK chat and instant messaging are only for dippy teens and online junkies, it's time to reconsider. Messaging vendors are introducing business versions of their wares, and Lotus and Microsoft plan to add chat and instant messaging to their groupware offerings. Judging from the two new products I looked at, chat and messaging software are ready to get to work.

Still skeptical? Consider this scenario: You're buried in a spreadsheet when a window pops up on your screen. A coworker from the branch office urgently wants you to review an attached file. If she'd used e-mail instead of instant messaging, her note might not have reached you for another half-hour. So you review the file and then invite her and another remote colleague to a chat room to brainstorm. You have just collaborated in real time and haven't spent a dime on long-distance phone calls.

OLD AND NEW TOOLS

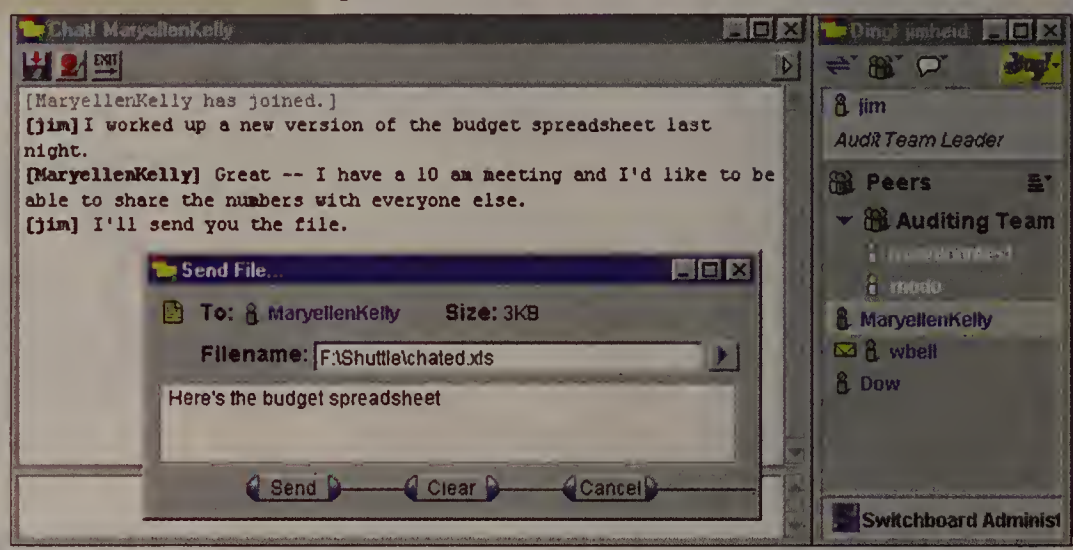
CHAT AND INSTANT messaging technologies aren't new, but the existing offerings are inappropriate for many businesses. Online services such as America Online provide instant messaging, but users must log on to the service to use it. Browser-based chat rooms, available through TalkCity and others, lack file transfer features. Mirabilis's popular Web-based ICQ utility routes traffic through its server network—and that can compromise security. Netopia Virtual Office for Windows, a Web-based product offered in a business version from Netscape's Netcenter (www.nvo.com), comes with basic chat features but unfortunately does not support group meetings.

The latest chat tools address these shortcomings. I tested two: Activerse's Ding 2.0 and Tribal Voice's PowWow 3.6. Both run unobtrusively in the background, coming to life when you receive a message. Like any instant messaging tool, these programs work best when you have a continuous Internet connection. But that isn't essential—unlike many other products, both Ding and PowWow let users leave messages even when you're offline.

Ding's strengths include simplicity, security, and standards support. Its interface is less complicated than PowWow's. The Enterprise version includes Switchboard, a server that securely handles connections between Ding users and enables you to broadcast messages to everyone on your network. Ding also supports the industry standard Lightweight Directory Access Protocol, which lets you locate other Ding users through directory sites such as Four11.com.

PowWow 3.6 goes farther, letting you set up communities or workgroups of other PowWow users. Each community has a bulletin board, a chat room, and a guest book. PowWow also lets you take chat companions on a Web tour, their browsers following along with yours—handy, say, for demonstrating a new intranet site. A whiteboard window lets you draw simple diagrams.

But PowWow's rich feature set can be daunting; and its interface is a bit cluttered, with too many separate windows for the user to keep track of.



ACTIVERSE'S DING lets you chat, organize users into groups, exchange files, and save a chat transcript.

THE RAP ON CHAT

FOR NOW, product interoperability is the exception, not the rule. If you work within one vendor's world, though, chat and instant messaging can enhance your business communications. Download Ding or PowWow for free evaluation from its vendor's Web site.

—*Jim Heid* ■

CHAT SOFTWARE FEATURES

Don't Laugh: Ding and PowWow Are Talking Business

PRODUCT	Price	Key features	Comments
Activerse Ding 2.0 512/708-1255 www.activerse.com	$30 per user; Enterprise version $695 for 20 users	file transfers, security, history window	Available for Windows 95, 98, and NT, and UNIX; Mac version coming. Inexpensive and easy to use.
Mirabilis ICQ +972-3-6488090 www.icq.com	free	file transfers, URL sending	Available for Windows 95, 98, and NT, and Mac. Great for chitchat, but security issues may give business users pause.
Netopia Virtual Office 510/814-5100 www.netopia.com	$50	predesigned Web pages, rudimentary chat and messaging	Available for Windows 95, 98, and NT. Efficient way for small businesses to establish a Web presence but lacks group chat features.
Tribal Voice PowWow 3.6 408/461-3100 www.tribal.com	$50 for ten users (one-year license)	built-in voice chat, text-to-speech conversion, group surfing, whiteboard	Available for Windows 95, 98, and NT only. Jam-packed with features, good for experienced PC users.

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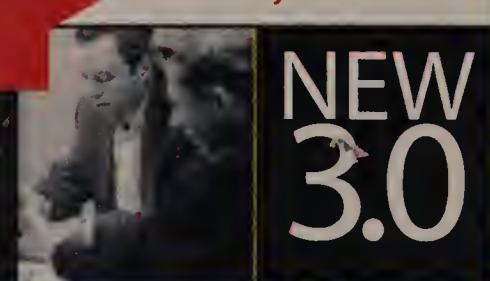

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NEW PRODUCTS

Dell's New Deal: A PII-350 System for Budget Buyers

NEW DIMENSION: The Pentium II-350-based V350 starts at $1599; $1723 gets you a 17-inch monitor and 64MB of RAM.

DESKTOP

POWER HUNGRY but penny-pinched? If you balk at spending more than $2000 for a Pentium II-400 system but want a bit more oomph than you'd get from one of the fast new $1000 to $1500 Celeron-based PCs (see *Top of the News*, "Double Feature"), check out Dell's new **Dimension V350**. This Pentium II-350–based desktop starts at $1599—the lowest price we've seen for any system with this fast a CPU, much less one from a top-tier vendor with a good reputation for reliability and service.

One of the first entries in Dell's new value line for small businesses and homes, the midtower Dimension V350 has some impressive hardware for a budget PC: a 512KB secondary cache, 6.4GB hard disk, 14X–32X CD-ROM drive, and 56-kbps U.S. Robotics x2 WinModem. The integrated ATI AGP graphics system comes with 8MB of RAM (most systems on our budget charts ship with 4MB), and the system bus runs at 100 MHz (pre–PII-350 systems are limited to 66 MHz, which takes a toll on performance). For software, you can choose between a package of Microsoft Home Essentials 98 with Microsoft Money 98 and Microsoft Office 97 Small Business Edition.

WHERE'S THE RAM?

BUT THE BASE V350 configuration does skimp in a few important areas. Our shipping unit comes with a 15-inch monitor, compared to the 17- or even 19-inch screens that accompany most systems on our Top 20 Budget Desktops chart. Growth is limited: You get only one free 5.25-inch bay and three 3.5-inch bays (two externally accessible, one internal), plus two PCI slots and one ISA/PCI slot. But the most irritating cost-cutting move is the decision to save on RAM: The V350 comes with a scant 32MB of memory, making it the first PII-350 we've tested that doesn't ship standard with at least 64MB. The upgrade to 64MB costs $69.

The RAM shortfall shows up in the V350's PC WorldBench 98 score of 169—more than 9 percent slower than the 186 average of all PII-350s we've tested with 64MB of RAM. In fact, the V350's score matched the averages for PII-333s with 32MB of RAM (the fastest 32MB systems we've tested previously) and for the new Celerons with 64MB of RAM. Unlike Celerons, how-

Dimension V350

PRO: Value-priced PII-350 system from top vendor.

CON: 32MB of RAM and 15-inch monitor in base configuration.

VALUE: A good deal, especially with memory and monitor upgrades.

Street price: $1599 ($1723 with 64MB of RAM and 17-inch monitor)

Dell Computer

800/388-8542

www.dell.com

INFONET NO. 733

PHOTOGRAPH: MARC SIMON

ever, the V350 can be upgraded. And we expect that the V350's performance would be on a par with its processor-class peers if you bumped the RAM up to 64MB.

Nevertheless, the base price makes this system noteworthy. It's not the deal of the century: For the same money, IDot.com will sell you a PII-333–based system with a larger monitor, a bigger hard drive, 64MB of RAM, and a better PC WorldBench 98 score. But even if you opt for the additional 32MB of RAM and a 17-inch monitor (we'd recommend both), the V350 costs only $1723—almost $450 less than the current average for PII-350 systems with 64MB of RAM. For general-purpose home and small office use, the V350 lowers the price bar on PII-350 performance.

—*Yardena Arar*

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INTERNET

FOR MORE PRODUCT news and the latest announcements, check out the PC World Daily News Service at www.pcworld.com/news.

Va-Va-Va-Vaio! Sony's Sexy Subnote

SUBNOTEBOOK

FROM ALL THE oohing and ahing people are doing over the **Sony Vaio 505GX**, you'd think it was a newborn child instead of a first-of-its-kind subnotebook. The 505GX's ultrathin and light design is indeed appealing, but its $2699 price should give you pause.

When you're done admiring the system's sleek profile (less than an inch thick) and chic silver-and-purple décor, note the 10-inch-wide keyboard—the unit's most important breakthrough feature. The cramped 9-inch keyboards on most subnotebooks, including the Hitachi VisionBook Traveler 3000 and the Mitsubishi Amity CN, make typing on them a painstaking chore. The extra inch on the 505GX creates a world of difference, giving you just enough room for touch-typing. Yet at 4.3 pounds (including floppy drive and AC adapter), the 505GX is a mere 3 ounces heavier than the Traveler or the Amity.

The Vaio 505GX is configured with a Pentium MMX-266 CPU (slow for a standard notebook but fast for a subnote), a 256KB secondary cache, 32MB of RAM, a 10.4-inch active-matrix screen, a 2.1GB hard drive, an internal 56-kbps K56flex modem, and Windows 98. (Its sibling, the 505G, comes with a PMMX-200 CPU for $1999.)

HOT LITTLE NUMBER: Sony's pioneering Vaio 505GX subnote has a keyboard wide enough for touch-typing but weighs only 4.3 pounds.

The 505GX won't win any performance championships, but our shipping unit moved through the business applications in our PC WorldBench 98 suite at a decent clip and didn't feel much slower than a conventional notebook. Although we haven't tested any other PMMX-266–based notebook stocked with a modest 256KB secondary cache, the 505GX's WorldBench 98 score of 103 fell about 13 percent short of the average for similarly configured notebooks that have a 512KB secondary cache—no surprise there. The system's battery lasted for 4.7 hours in our tests, an adequate figure but hardly stellar.

Sony's 505 series has redefined subnotebooks, but for a high price. And the optional CD-ROM drive you'll need in order to load most software costs an additional $299. For roughly the same overall cost, you could get a fast, fully loaded Pentium II-266 notebook with a 13.3-inch screen. But as other vendors follow Sony's lead (Sharp's Actius A100 Ultra-Light, due this fall, has a similar physical profile), the price of these ultrathin subnotebooks should drop. Our advice: Ooh and ah now, but wait a few months to let competition run its course.

—*Vince Bielski*

Sony Vaio 505GX

PRO: Super slim and light; keyboard large enough for touch-typing.

CON: High price; CD-ROM drive not included in base configuration.

VALUE: Innovative subnotebook will be even more attractive once the price falls.

Street price: $2699

Sony Electronics

800/476-6972

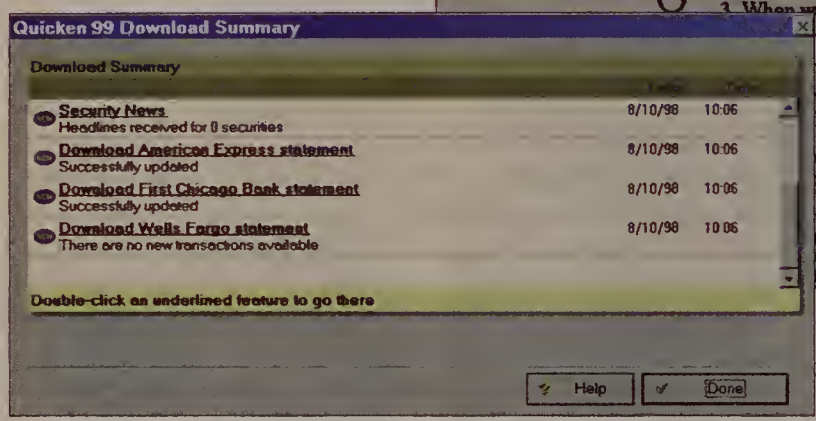
www.sony.com

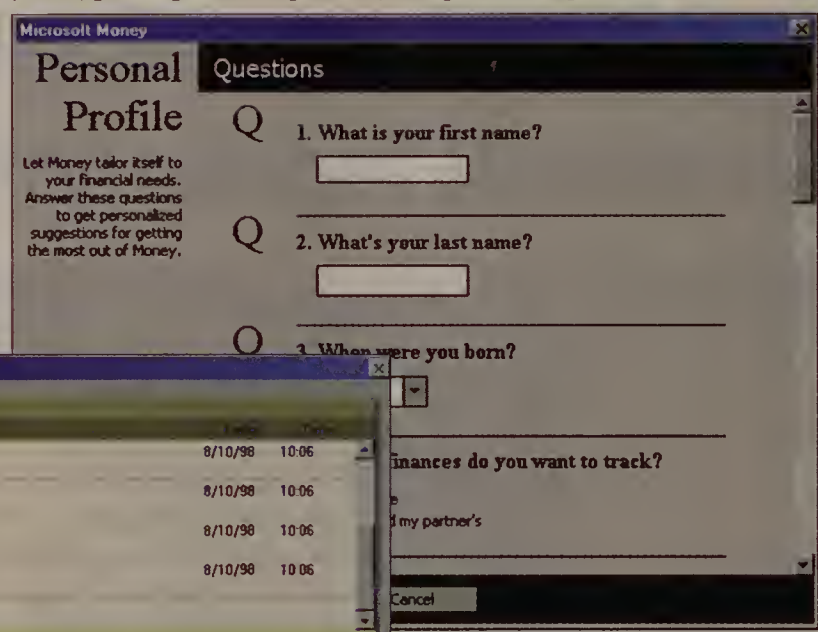
INFONET NO. 734

Quicken Versus Money: The 1999 Editions

PERSONAL FINANCE

DO YOU STILL keep your books with pen and ink and a pocket calculator or spreadsheet? Now that banks, brokerages, and even the IRS let you track and manage your money online, it may be time to go electronic. New versions of Intuit's Quicken and Microsoft Money—the mainstays of personal finance software—make data entry and planning easier than ever, for upgraders as well as newcomers. I reviewed preproduction versions of **Quicken 99 Deluxe** and **Money 99 Financial Suite**.





MONEY 99 (above right) makes a plan based on your input; Quicken 99 updates several online accounts with one click.

Both programs suggest ways to improve your finances, help you use the Web to implement those hints, and start up with instant snapshots of your finances. Money's opening screen hasn't changed dramatically since last year's major overhaul: It still resembles a Web site. Now, however, you can choose the information you'd like to see at start-up: account balances, budgets, payable bills, investment analyses, even links to news and planning advice. In general, I found Money 99 handsomer and easier to navigate than Money 98.

Money 99's Help & Answer Wizard responds to questions you type in plain English by bringing up well-written on-screen help. Also new is a Personal Profile that develops a Personal Action Plan based on your answers to questions about attitude toward risk and expected life events (sending a child to college, retirement, and so on). The plan incorporates Advisor FYI, a holdover from Money 98 that draws information from both the CD and the Web. Some of the guidance is simplistic (pay off higher-interest credit cards first), but the program can point you to useful Web sites. Money also does a good job of integrating useful features on the Microsoft Investor Web site such as stock quotes and financial news.

QUICKEN'S FACE-LIFT

QUICKEN 98 launched to whatever window you last used; Quicken 99 gets a new look with an opening screen that also provides an at-a-glance look at your finances. Access to all areas of the program is quick and easy via Financial Activity Centers (banking, investing, and so on). But Quicken 99's biggest innovations involve simplified data entry. With One Step Update, users can download information from all their online financial services—brokerages, banks, credit card accounts, and the like—with one mouse click.

The new QuickEntry feature lets you record transactions by clicking a desktop icon; the procedure is significantly faster than running Quicken itself and maneuvering to the appropriate register. The information is transferred the next time you launch the full program. WebEntry, a feature that mobile users should find particularly valuable, enables you to enter transactions onto a secure area in Quicken.com from any browser—again, for downloading later to Quicken. As usual, Quicken comes in several versions, from the $30 Basic to the $100 Financial Center, which is a good value since it also includes TurboTax Deluxe with extensive tax preparation help. My beta made mistakes transferring data from an earlier version; Intuit said these bugs would be fixed in the shipping copy.

Which program is right for you? If you care only about the basics—balancing your checkbook, using online banking to pay bills and download transactions, and tracking investments—either will do. Visit the Web sites for each product, and pick the look you prefer. Quicken 99, with its Web-Entry innovation, will have special appeal to users who like to catch up with their data-entry chores whenever they they happen to have a spare moment. Money 99 delves a little deeper into your finances to help you plan for the future.

—Theresa W. Carey ▶

Quicken 99 Deluxe

PRO: Great data entry aids; lots of personalization options.

CON: Data transfers for upgrades buggy in the preproduction version.

VALUE: All-around personal finance tool makes tracking money easier than ever.

Street price: $60

Intuit

800/446-8848

www.intuit.com

Money 99 Financial Suite

PRO: Extensive personalization and well-written help.

CON: Some Advisor FYI solutions are a bit simplistic.

VALUE: Solid personal finance manager with excellent planning tools, especially for Web junkies.

Microsoft

800/426-9400

www.microsoft.com/money

Street price: $65

INFONET NO. 735

HAVE WE GOT YOUR ATTENTION YET?

July 1998 VisionMaster 450 $699 ESP

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	VisionMaster 502 (19.5" VIS)	TCO '95	0.27mm/dp	110khz	1800 x 1440@74hz	$1,059
	VisionMaster 501 (19.5" VIS)	TCO '95	0.27mm/dp	96khz	1600 x 1200@75hz	$999
19"	VisionMaster 450 (18.0" VIS)	TCO '95	0.26mm/dp	102khz	1600 x 1200@80hz	$699
17"	VisionMaster Pro 400 (16.0" VIS)	TCO '95	0.25mm/AG	96khz	1600 x 1200@75hz	$529
	VisionMaster 400 (16.0" VIS)	TCO '95	0.26mm/dp	96khz	1600 x 1200@75hz	$489
15"	VisionMaster 350 (13.7" VIS)	MPR-II	0.28mm/dp	69khz	1280 x 1024@65hz	$248

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PC MAGAZINE Best of 1997
January 6, 1998
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PC Computing
May 1998
VisionMaster 450

CADALYST LABS 1998
Perfect Five-Star Rating
January 1998
VisionMaster 450
VisionMaster Pro 500

ComputerLife
Perfect Five-Star Rating
November 1997
VisionMaster Pro 17

Performance & Technical Excellence
March 1997
VisionMaster Pro 21

MW EDITORS' CHOICE
Six Time Winner
Jan 1997, Feb 1997, March 1997, April 1997, May 1997, June 1997
VisionMaster Pro 21

PC MAGAZINE EDITORS' CHOICE
October 7, 1997
VisionMaster Pro 17

CADALYST LABS 1998
March 1997
VisionMaster Pro 21

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VisionMaster Pro 17
April 1998
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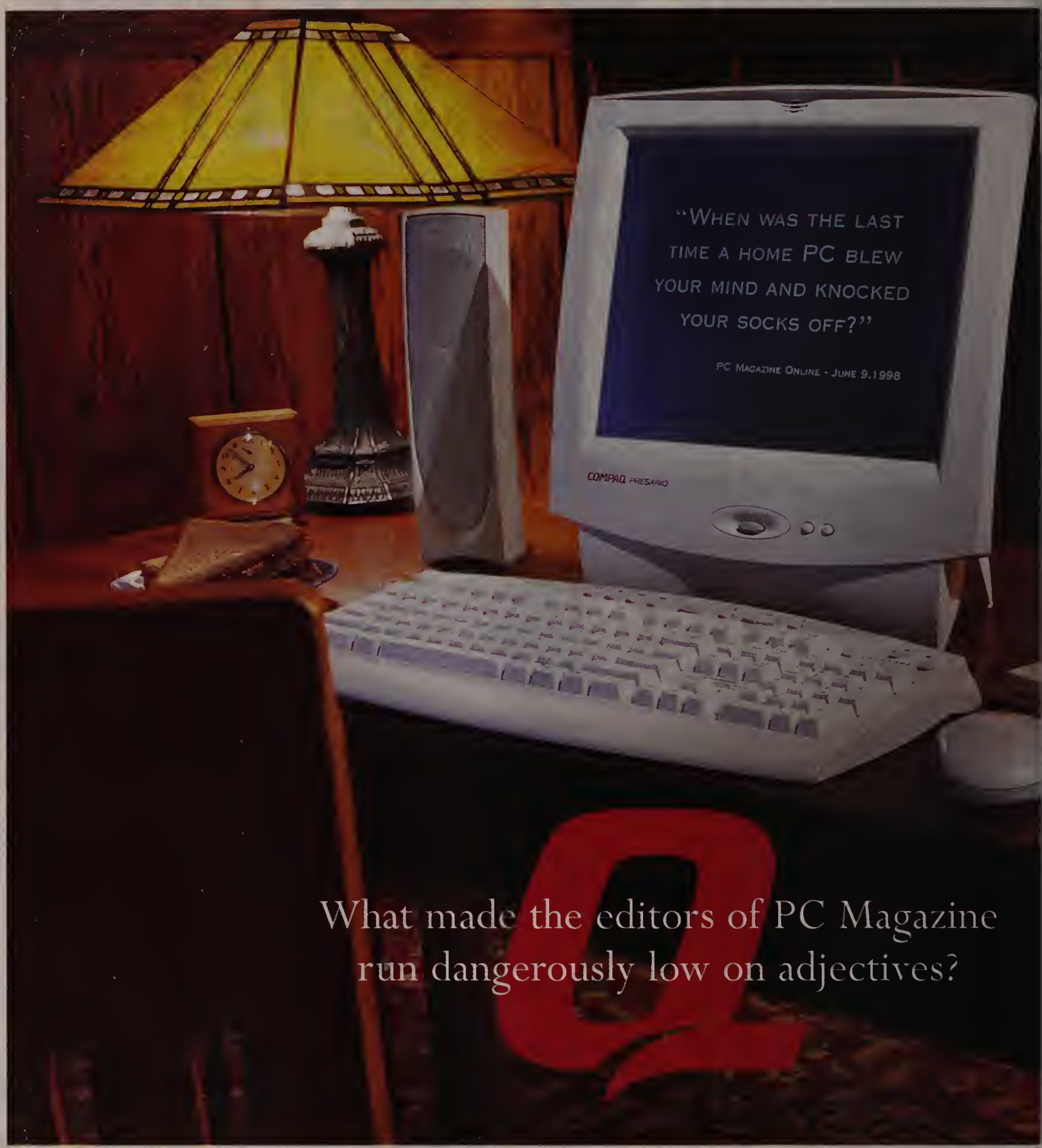

The amazingly fast, gratifyingly complete, and irresistibly priced Presario 5600 Series* Internet PC, that's what. processor running at 400 MHz, plus a unique hardware-and-software package "geared toward enhancing your Add the $899† Flat Panel Monitor ("The picture quality you'll get from this For all the details on the machine that "redefines the state of the art for home PCs,"

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setup is superb"), and what have you got? "More innovation than we've ever seen in a home PC."

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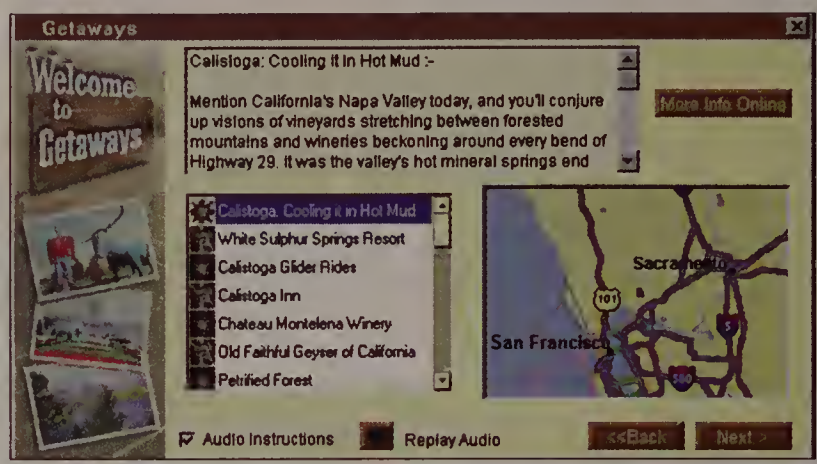
Rand McNally's Dynamic Trip-Taking Duo

TRAVEL PLANNING

WHETHER YOU'RE headed across town for a business appointment or cross-country on a family vacation, Rand McNally's got you covered. With **TripMaker Deluxe 1999** and **StreetFinder Deluxe 1999**—the latest editions of its blockbuster travel planning and mapping programs—you'll never need a cheap gas station map again. I tried preproduction versions of both.

Like its predecessors, TripMaker 1999 uses a wonderfully simple interface to help you plan and map your journey. You identify your destination, the places you'd like to stop along the way, the type of road you prefer, and so on. TripMaker generates an itinerary and a map, then analyzes your trip with a new routing wizard called RoadSense, which automatically steers you around potential trouble spots such as busy metropolitan areas or construction sites (you can update the latter information at any time via downloads from Rand McNally's Web site).



MAPPING AND MORE: The Getaways feature in Rand McNally's TripMaker Deluxe 1999 suggests side trips from you main destination.

In my tests, the software mapped capably and its tools were easy to use, with just one gotcha: Because its routes are based on the driving hours you specify—from, say, 9 a.m. to 5 p.m.—your driving day might end in the middle of nowhere. Don't forget a tent! Or better yet, figure out where you want to stop each night and instruct the software accordingly. The program's Getaways feature has 100 preplanned weekend adventures tailored to specific interests and locations. Going to San Francisco on business? TripMaker advises you to rent a car and head for Sonoma County, where you can indulge in a mud bath and enjoy some of the area's great wine.

Whereas TripMaker is designed to help you plan entire vacations or long-haul business trips, StreetFinder focuses on navigating within cities. Its Trip Organizer feature can find hotels, appointment addresses, and restaurants; it can also track such business-trip details as contacts, itineraries, and expenses. But if you want address-to-address driving directions, StreetFinder must retrieve them from the Web. (The software expects you to have Internet access either via your LAN or through dial-up networking—and it will launch the latter if need be—but it does not have to start up your browser.) The Concierge feature offers details and recommendations on local nightlife, business services, transportation, and more.

TripMaker and StreetFinder both integrate the complete Mobil Travel Guide into the software, so you can choose hotels and restaurants based on trusted ratings. You can also make car, hotel, and plane reservations on a site operated jointly by Rand McNally and the Internet Travel Network. Finally, a new menu option lets PalmPilot and Palm III owners zap a map or an itinerary directly into these PDAs. And despite their many features, these programs are still reasonably priced at $50. (If you've got a previous version or any competing product, a $20 rebate makes the upgrade worthwhile.)

—*Angela Navarrete* ▶

STREETFINDER TRACKS appointments and expenses as well as giving directions.

StreetFinder Deluxe 1999

PRO: Detailed, accurate maps; good local information.

CON: Requires Internet access for door-to-door driving directions.

VALUE: Excellent companion for business travel in large cities.

List price: $50

INFONET NO. 736

TripMaker Deluxe 1999

PRO: Easy to use, covers nearly every aspect of trip planning.

CON: If you don't pick your stopover points, you might end up spending the night in Podunk.

VALUE: Valuable resource for long-haul business or pleasure travelers.

List price: $50

INFONET NO. 737

Rand McNally
800/333-0136
www.randmcnally.com

QUICK TAKES

Agfa's Affordable Digital Camera

FOR ME, vacation means blowing way too much money on 35mm film and processing. Digital cameras eliminate those expenses, but I've been scared off by the camera's prices—or turned off by their so-so picture quality. Time to reconsider: Agfa's $399 (street) **EPhoto 780** captures good-looking photos at up to 1024 by 768 resolution, and it comes with both a viewfinder and an LCD screen. A 2MB memory card stores 12 to 96 pictures (depending on resolution); uploading them to a PC is easy with the included serial cable. I wish the EPhoto 780 had a zoom lens (costlier models do) and a printed manual (the Acrobat help file isn't much use at the beach), but overall it's a great camera for the money. Agfa Division; 800/976-2432; www.agfahome.com

INFONET NO. 748

—*Harry McCracken*

It is a machine.

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STARTING AT $2,200*

Painless Vinyl-to-CD Transition

CD-R SOFTWARE

STILL CARTING around crates of old, scratchy LPs in moldy cardboard jackets? Join us in the nineties and move your Bee Gees collection from vinyl to compact disc. You could use the software bundled with most CD recorders, but two third-party packages—Adaptec's **Easy CD Creator Deluxe 3.5** and Hi-Val's **CD Right Plus**—make the job much easier.

To create a custom CD, you record .wav files off audio CDs or hook up a stereo to your sound card's line-in jack and capture audio from LPs, tapes, or even radio broadcasts using Windows' Sound Recorder. Any CD mastering program will convert .wav files to audio CD format and burn the disc. But my preproduction copy of Easy CD Creator and shipping unit of CD Right Plus also let you record on the fly, without saving audio to a hard drive.

As in the previous version, Easy CD Creator Deluxe 3.5's CD Spin Doctor filters out extraneous noise, balances audio levels, and inserts track breaks when it detects silence. The upgrade also lets you add effects—an echoey reverb, a robotic-sounding Metalizer, even a Time Warp that simulates a vintage broadcast sound (for, say, a novelty recording). You can listen to the filtered and morphed recording before you actually burn the disc, which makes the process of figuring out how to control these filters a lot quicker—and cheaper.

CD Right Plus doesn't have filters, so it's easier to use—you can start recording in two mouse clicks. But at $99, it's overpriced: Adaptec gives you more for $9 less. If you want to keep those frowsy old LPs Stayin' Alive, Easy CD Creator Deluxe is the way to go.

—Andrew Brandt

CD Right Plus

PRO: Very easy to use.

CON: No noise filtering or special effects; expensive.

VALUE: No serious competition to Easy CD Creator.

Street price: $99

Hi-Val

714/953-3000

www.hivai.com

INFONET NO. 738

Easy CD Creator Deluxe 3.5

PRO: Excellent filtering and sound effects features.

CON: Slight learning curve.

VALUE: Best CD recording package on the market.

Street price: $90

Adaptec

800/442-7274

www.adaptec.com

INFONET NO. 739

Is It the Web or Is It CompuServe?

ONLINE SERVICE

IN THE BEGINNING, there was CompuServe. Then America Online and the Web came along and knocked the stuffing out of the online-service pioneer. Now, CompuServe is owned by AOL—and trying to reinvent itself for the Web age.

In fact, **CompuServe 4.0,** the new interface software, turns the service into a hybrid—not quite Web based, but not its old proprietary self, either.

Like Excite and Lycos, the new CompuServe interface splits its start page up into channels—subsections that meld CompuServe's exclusive features (forums, file libraries, and databases) with links to relevant Web sites. Using an integrated version of Internet Explorer, you can hop back and forth between external sites and internal content, and create a list of Favorites that combines both. As before, CompuServe membership includes full ISP services, such as POP3 e-mail, newsgroups, and Web access from a browser of your choice.

COMPUSERVE'S NEW MAIN SCREEN bristles with news headlines and channels—just like Excite, Yahoo, and other Web portals.

CompuServe devotees who spend a lot of time on the Web will like the new look. But membership's biggest benefit continues to be the forums, which still beat anything on AOL or the Net at large.

Although they're not as bustling as they were in their heyday, the forums remain great destinations for advice, debate, and chatter—not just on techie topics (for which they have long been famous), but on everything from buying a car to UFO sightings. Unfortunately, the forums' new HTML format largely replicates what's wrong with the Web. Screens load slowly and are plastered with banner ads. I ended up switching back to the earlier Windows interface (an option that version 4.0 intelligently offers).

—Harry McCracken ▶

CompuServe 4.0

PRO: Neat Web and CompuServe integration; meaty forums.

CON: Slow; more ads than it had in the past.

VALUE: Great forums still worth the subscription fee for some.

Monthly price: $10 for 5 hours a month, $25 for unlimited access

CompuServe Interactive Services

800/848-8990

www.compuserve.com

INFONET NO. 754

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- ***13.3" XGA Active Matrix Color Display***
- ***64 MB SDRAM**, expandable to 128 MB*
- ***3-D Graphics Accelerator w/4MB SGRAM***
- ***6.0 GB Ultra DMA removable Hard Drive***
- *45 Watt/hour Lithium Ion Smart Battery*
- *512k Pipeline Burst L2 cache*
- *3.5" Floppy Drive and 20X max variable speed CD-ROM, **both built-in, no need to swap***
- *Integrated dual-button **Touchpad & Pointing Stick**, both active simultaneously*
- *16-bit Stereo Audio*
- *Two Type II or one Type III PCMCIA slot, CardBus and ZoomedVideo supported*
- *PCI graphics accelerator w/2 MB DRAM*
- *Parallel, Serial, PS/2, VGA, 2-way Infrared port, TV out, USB*
- *Kensington lock support*
- *One-year extendable warranty*
- ***Microsoft Windows® 98 pre-installed***

300 MHz $2999

▶ **233 MHz 12.1" Display $1199**

Winner of over 150 industry awards

Notebook Speed Breakthrough

If you've been waiting for a notebook computer that can work as fast as a desktop system, wait no more. Intel has pushed portable computing processors to speeds never seen before with the new Intel® Pentium® II Processor at 300 MHz. To keep up, we've loaded up this WinBook XLi with 64 MB of SDRAM, a huge 6.0 GB Ultra DMA hard drive, 4 MB of SGRAM for dazzling 3-D graphics on the crisp 13.3" TFT display. All this for less than $3000! Call today or visit **www.winbook.com** to see our full line of **"Critically Proven"** notebooks.

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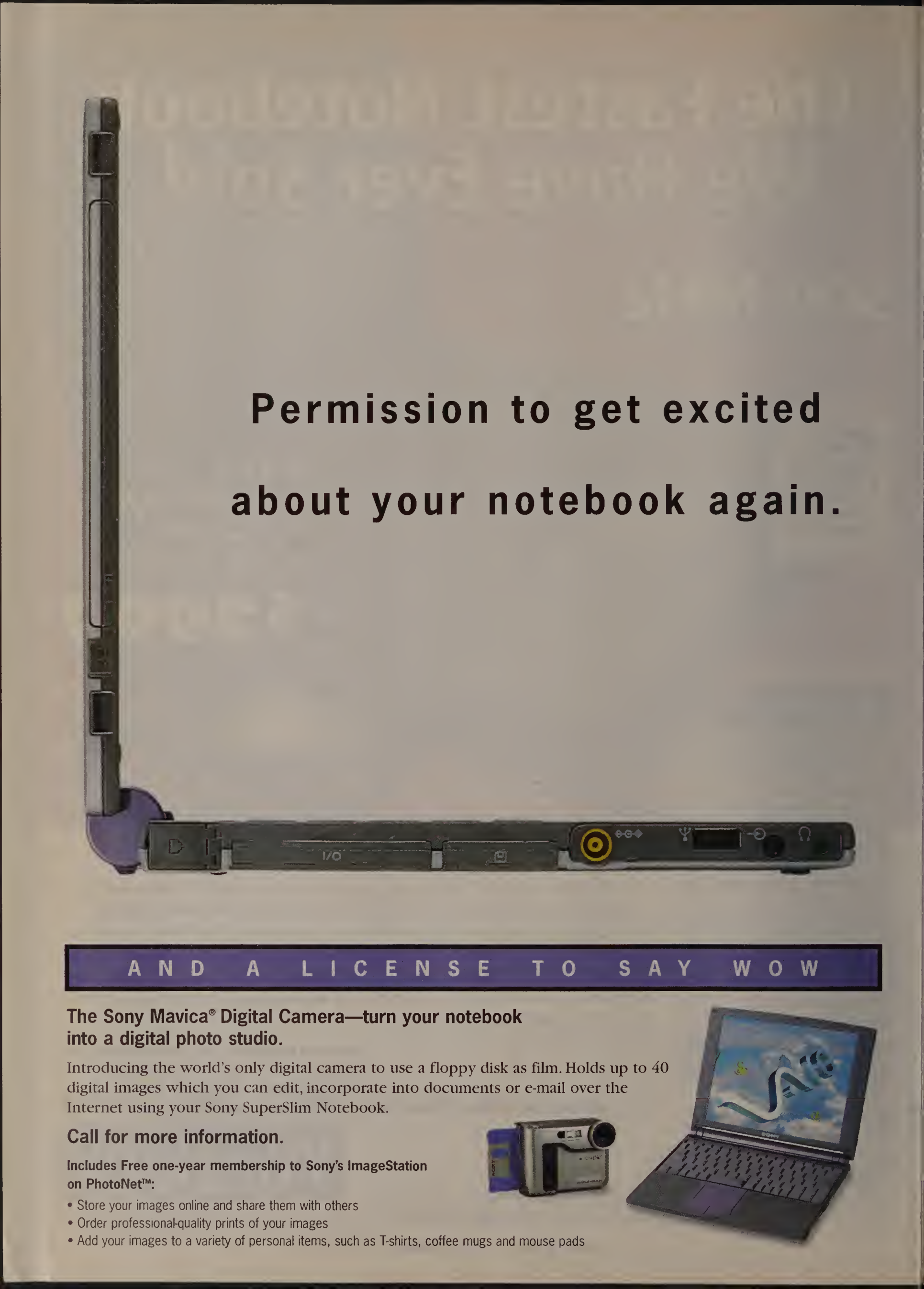
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The Sony Mavica® Digital Camera—turn your notebook into a digital photo studio.
Introducing the world's only digital camera to use a floppy disk as film. Holds up to 40 digital images which you can edit, incorporate into documents or e-mail over the Internet using your Sony SuperSlim Notebook.
Call for more information.
Includes Free one-year membership to Sony's ImageStation on PhotoNet™:
• Store your images online and share them with others
• Order professional-quality prints of your images
• Add your images to a variety of personal items, such as T-shirts, coffee mugs and mouse pads

SONY

Under 3 pounds. Less than 1 inch thick.

Remember the excitement generated by the first-ever notebooks? It's déjà vu all over again with the new Sony SuperSlim Notebook. This much power can't get much lighter and still be dubbed a notebook. Inside its tough magnesium-alloy case you'll find some notable innovations. The programmable power key short-cuts you to most-used functions like e-mail or browsers without having to close down the file you're in. i.LINK™ gives you a port for capturing digital video. And Signature Capture lets you add your John Hancock to original works or documents. It's time to get excited about your notebook again.

PCG-505GX

- 266 MHz Intel® Pentium® processor with MMX™ technology
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- 32 MB SDRAM (expandable to 64 MB)
- 2.1 GB hard drive
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- 128-bit graphics accelerator
- Windows® 98 pre-installed
- Programmable power key
- Touch pad with pen operation
- i.LINK (IEEE-1394) port for digital video capture∆
- Price includes accessories: AC adapter, rechargeable battery, floppy disk drive, port replicator

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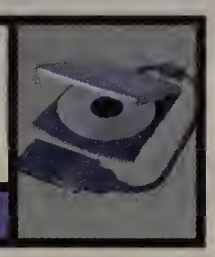
Slim, color-coordinated 14X (MAX) CD-ROM drive for serious multimedia capability. Or listen to CDs with headphones.



PCGA-CD5: $299.99

Rechargeable battery pack (large)

Double the time you can spend on your SuperSlim Notebook with this double capacity lithium ion battery.

PCG-BP52: $299.99

Stereo speakers

Just clip these speakers on both sides of the display panel for enhanced sound performance.

PCGA-SP5: $99.99

AC adapter

Just plug it into your VAIO® 505 SuperSlim Notebook and forget all your concerns about battery life.

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Lotus Organizer 5.0: A PIM for All Reasons

P I M

IT'S IRONIC: Personal information managers are supposed to combat information overload, but many suffer from *feature* overload. Lotus Organizer's strength, however, has always been its accessibility—and that's unchanged in version 5.0. I reviewed a preproduction copy.

While retaining its familiar spiral-bound look, this $79 PIM adds features usually found only in costlier packages. It's a good choice if you need more help than most PIMs deliver, but aren't ready to shell out $160 or more for a full-blown contact manager such as Symantec's ACT.

Unlike Microsoft's labyrinthine Outlook 98, **Lotus Organizer 5.0** doesn't attempt e-mail or file management. Instead, Lotus beefed up the core address book and calendar. You now get a chronological log of activities and data associated with each contact—appointments, calls, letters, Web links, and more. Similarly, the new Day Planner provides an at-a-glance view of each day's appointments, to-do tasks, phone calls, and notes.

Small touches make the package more Internet-friendly than before: Type a URL into a note, and it's converted into a live hyperlink. Also new is support for the new ICalendar standard, which lets users with different PIMs coordinate meetings via e-mail or the Web.

Organizer still isn't the most flexible of PIMs. Address book fields are difficult to customize, and you can't design templates for different types of data (a task at which Starfish's $50 Sidekick 98 excels). Furthermore, people who've been using Organizer GS or 4.1 with Lotus Notes databases for corporate scheduling and contacts shouldn't upgrade—the new version doesn't support Notes (Lotus says these customers will get many of Organizer's features in Notes 5.0). But for many, Organizer 5.0 delivers the right blend of simplicity and sophistication.

—*Harry McCracken*

Lotus Organizer 5.0

PRO: Simple interface, powerful address book and calendar.

CON: Could be more customizable.

VALUE: A lot of PIM.

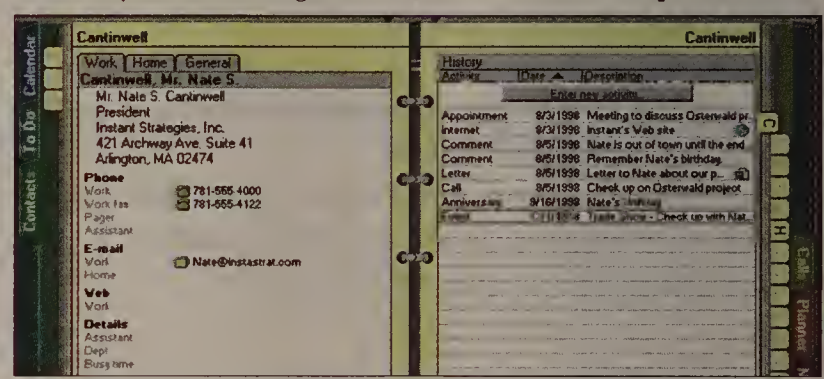
List price: $79, $20 upgrade (from Organizer or any competitor)

Lotus Development

800/343-5414

www.lotus.com

INFONET NO. 753



ORGANIZER'S ADDRESS BOOK now keeps track of appointments, phone calls, letters, and other items associated with your contacts.

A Bigger Tool Kit: Nuts & Bolts 98

U T I L I T Y

AS HARDWARE and software become more powerful, so do PC utility suites. The latest incarnation of Network Associates' Nuts & Bolts noses ahead of archrival Norton Utilities with an extended set of useful features. I tested the shipping version, which works with Windows 95 and 98.

Nuts & Bolts 98 consists of more than two dozen utilities in four basic groups: repair/recover, clean/optimize, prevent/protect, and secure/manage. In addition to disk analysis, system status monitoring, and other basics, you get some features introduced several months ago in Network Associates' $29 Safe and Sound maintenance and crash prevention package. Most notable are PC Checkup (an exhaustive Windows diagnostic) and Retake (which continuously backs up files you designate to a protected part of your hard disk, a Zip disk, a network drive, or other media).

N&B 98's year-2000 wizard checks the internal clock in your PC's BIOS and adds a fix to your autoexec.bat file if need be. It also examines your data and applications for potential year-2000 issues.

N&B crash protection is supposed to recover from even the worst Windows wipeouts, and it did indeed recover from a crash induced by a supplied test file. Rounding out N&B is Network Associates' McAfee VirusScan (with three months of free updates) and PGP File, a limited version of a high-security package for encrypting e-mail file attachments.

Released last year, the original Nuts & Bolts had a reputation for causing more problems than it solved with some PCs (some of the bugs were addressed in patches). But in my tests with three Pentium PCs of varying vintage and configuration, the new version worked flawlessly.

While N&B 98 delivers more features than Norton Utilities for $30 less, using them all takes time and effort. You can, however, just use the program to quietly monitor your PC, or to save the day when the unexpected happens. And if you're willing to roll up your sleeves and poke around inside the software and hardware of your PC, the latest N&B offers a wealth of fine-tuning options.

—*Stan Miastkowski* ▶

Nuts & Bolts 98

PRO: Comprehensive, effective, reliable; helpful year-2000 wizard.

CON: Using all its features would be time-consuming.

VALUE: Delivers more than archrival Norton Utilities and costs less.

Street price: $50

Network Associates

408/988-3832

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INFONET NO. 743

More customers came back to Gateway last year than any other computer company.

Let's talk about why.

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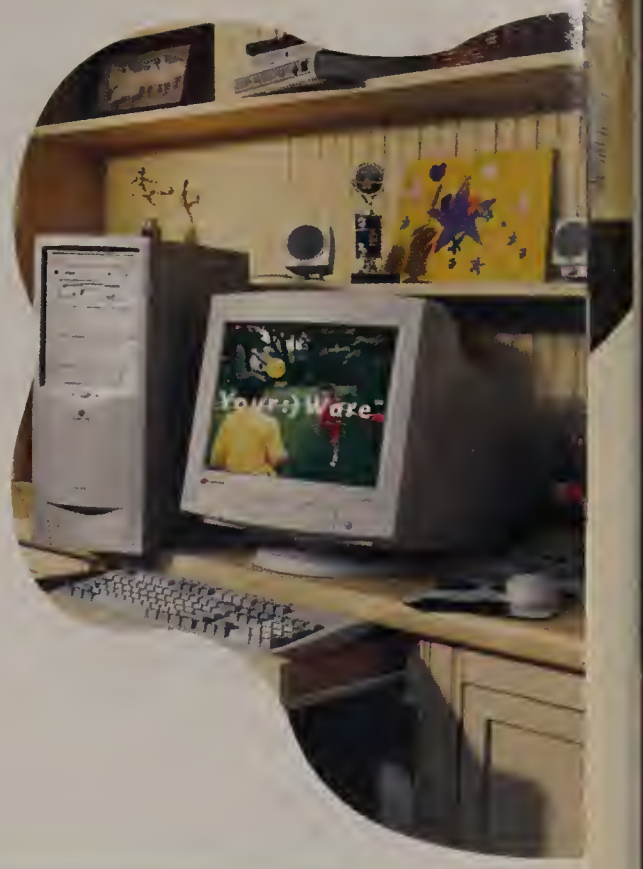
Let's talk about a better way to buy and own a computer.

Let's talk about loyalty. Three out of every four Gateway customers came back to Gateway last year.[1] No other computer company has fans so loyal. Why? Because we offer award-winning products at great prices, backed by unbeatable customer service and support. And to make buying and owning a computer even easier, we've come up with the Your:)Ware℠ program.[2] With Your:)Ware, you buy a new Gateway™ PC with no money down, making monthly payments starting as low as $49.95 a month for 48 months*—we build it just for you, with optional unlimited Internet access[3]. Best of all, you can stay on top of new technology, because after two years, you have the option to trade in your Gateway PC toward the purchase of a new one. Once you buy your first Gateway computer, you're a believer.



Introducing Your:)Ware.

Customized Hardware
With Your:)Ware you get to choose exactly what you want. And that's not even the best part.

Obsolescence Protection
The computer you build today will still be useful tomorrow because you have the option to trade it in toward the purchase of a new one in two years.

Internet Access
Convenient access to the World Wide Web is just a few clicks away on a PC that's specifically built to handle it. And with the Your:)Ware program, you can get unlimited Internet access[3]. Can we help you with anything else?

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It doesn't matter if it's for a family of six; we can build a PC with software that's perfect for everyone. Tell us who's going to use it and for what purpose, so we can put together a system that fits their specific needs.

Service
After all that, you have to ask? Gateway Gold℠ Service for G-Series PCs means you'll get quality service 24 hours a day, 7 days a week from the time we help you build your PC, on through the life of your computer.**

Low Monthly Payment
You can finance your computer through Your:)Ware for one low monthly payment.

A great place to start

- Intel® Celeron™ Processor 333MHz with 128K Cache
- 32MB SDRAM
- EV500 15" Monitor (13.9" viewable)
- 4MB 3-D AGP Graphics
- 6.4GB Hard Drive
- DVD-ROM Drive & MPEG2 Decoder
- Boston Acoustics® BA635™ Speakers
- U.S. Robotics® 56K[4] Voice Winmodem

Trade-in option in 2 years

Unlimited Internet Access[3]

Microsoft® Windows® 98 & MS® Home Essentials™

Gateway Gold℠ Service™ for G-Series PCs

As low as
$49.95/mo.
for 48 mos or $1259*

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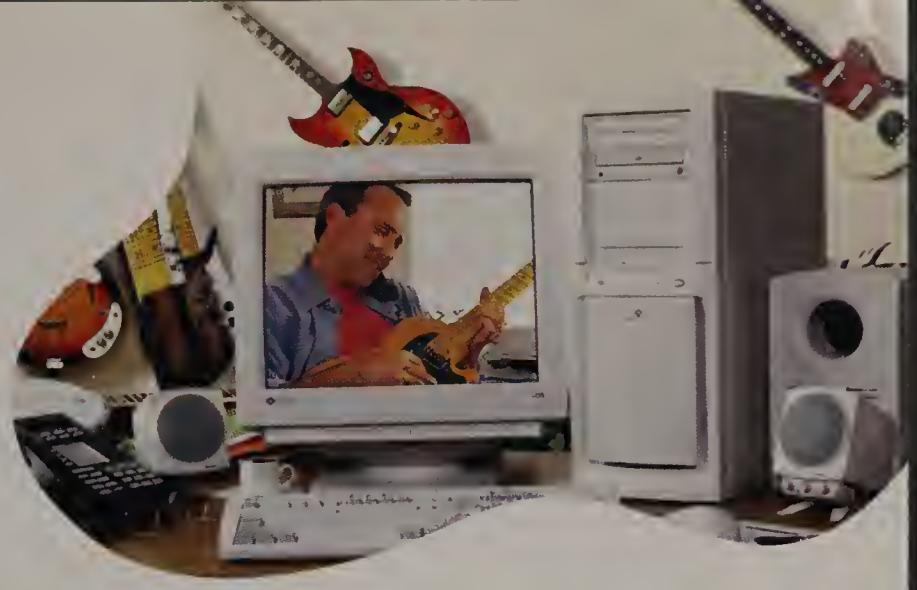
** Gateway Gold on-site and installation services are administered by PC Technology Services, Inc. for product (excluding mice, keyboards, monitors and Solo portables) purchased and located in the continental United States, Alaska, Hawaii, Puerto Rico and Canada.

Let's talk about life on the technological edge.

How can you keep up with the speed of new technology? Easy. Buy from the company that gives you the hottest stuff out there. Our G6-400 won the **Editor's Choice Award** from the May '98 *PC Magazine* and our G-Series won the **1998 World Class Award** from *PC World*. Not bad, but we also just came out with the G6-450, featuring the fastest Pentium® II processor yet. Let us design a system personalized just for you. And with the Your:)Ware℠ program, you can ride the wave of innovation with the option of trading in your Gateway™ PC after two years toward the purchase of a new one.[2] We call it obsolescence protection. Another reason technology buffs keep coming back to Gateway.



The speed you need today (and in the future)

Every Gateway client is unique, and so is every Gateway PC. The systems here are just examples of what we can build for you.

Fast G6-400

- Intel® Pentium II Processor 400MHz with 512K Cache
- 64MB SDRAM
- EV700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- 8MB AGP Graphics Accelerator
- 10GB Ultra ATA Hard Drive
- DVD-ROM Drive & MPEG2 Decoder
- SoundBlaster® AudioPCI™ 64V
- Boston Acoustics® BA635™ Speakers
- U.S. Robotics® 56K[4] Voice Winmodem
- Mid-Tower Case
- MultiFunction Keyboard & MS® IntelliMouse®
- Microsoft® Windows® 98 & MS Home Essentials™ Software
- Gateway Gold℠ Service** for G-Series PCs
- As low as **$56/mo.** for 48 mos. or $1999*

Scary G6-450

- Intel Pentium II Processor 450MHz with 512K Cache
- 128MB SDRAM
- VX900 .26 Screen Pitch 19" Monitor (18" viewable)
- 8MB AGP Graphics Accelerator
- 10GB Ultra ATA Hard Drive
- DVD-ROM Drive & MPEG2 Decoder
- SoundBlaster AudioPCI 64V
- Boston Acoustics BA635 Speakers
- U.S. Robotics 56K[4] Voice Winmodem
- Mid-Tower Case
- MultiFunction Keyboard & MS IntelliMouse
- Microsoft Windows 98 & MS Home Essentials Software
- Gateway Gold Service** for G-Series PCs
- As low as **$69/mo.** for 48 mos. or $2479*

Extra bells and whistles

All these add-ons are available when you purchase a Gateway system.

Voodoo2™ Card with Extreme Gaming Software[5] ($249)

MS SideWinder® Precision Pro Joystick ($59)

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Epson® PhotoPC™ 550 Color Digital Camera ($249)

Iomega® 100MB Internal ZIP® Drive ($99)

HP 722Cse Color Ink Jet Printer ($299)

Add a Zip™ BUILT-IN drive for only $99

The Capacity To Do More™ with your PC.
It's today's standard in high-capacity removal storage.
Exchange and carry your files anywhere.
Organize and protect more of your stuff.

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The Screamer

G6-450XL

- Intel Pentium II Processor 450MHz with 512K Cache
- 128MB SDRAM
- VX900 .26 Screen Pitch 19" Monitor (18" viewable)
- 8MB AGP Graphics Accelerator
- 12MB 3Dfx™ Voodoo2 3-D Accelerator & Extreme Gaming Software
- TV/FM Tuner Card
- 16GB Ultra ATA Hard Drive
- DVD-ROM Drive & MPEG2 Decoder
- Philips CD-RW CD-Rewritable Drive
- SoundBlaster AudioPCI 64V
- Boston Acoustics MediaTheater™ 3-Piece Speaker System
- U.S. Robotics 56K[4] Voice Winmodem
- Tower Case
- MultiFunction Keyboard & MS IntelliMouse
- Microsoft Windows 98 & MS Choice Software
- Gateway Gold Service** for G-Series PCs
- As low as **$96/mo.** for 48 mos. or $3449*

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Let's talk about home economics.

People who buy Gateway™ PCs for their home say they want a computer that does everything — including fit into their budget. We can do the same for you. Our G-Series was recently named **Best Home Desktop PC**, receiving the **World Class Award** from the July '98 ***PC World***. The G6-400, in fact, was rated **WinList Fastest Performer** by the May to September '98 ***Windows Magazine***. We'll take the system you choose and load it up with all the hardware and software your family needs. Including Internet access,[3] and flexible service and support 24 hours a day, seven days a week. Plus, with the Your:)Ware℠ program,[2] you have the option of trading in your Gateway PC toward the purchase of a new one in two years. That's a home improvement anyone can make.

Get more bang for your buck

Every Gateway client is unique, and so is every Gateway PC. The systems here are just examples of what we can build for you.

Family Friend G6-333C

- Intel® Celeron™ Processor 333MHz with 128K Cache
- 32MB SDRAM
- EV700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- 4MB 3-D AGP Graphics
- 6.4GB Ultra ATA Hard Drive
- DVD-ROM Drive & MPEG2 Decoder
- SoundBlaster® AudioPCI™ 64V
- Boston Acoustics® BA635™ Speakers
- U.S. Robotics® 56K[4] Voice Winmodem
- Mid-Tower Case
- MultiFunction Keyboard & Mouse
- Canon® Color Printer
- Microsoft Windows® 98 & MS Home Essentials™ Software
- Gateway Gold[SM] Service** for G-Series PCs[4]
- As low as **$44/mo.** for 48 mos. or $1568*

Extended Family G6-450

- Intel Pentium® II Processor 450MHz with 512K Cache
- 128MB SDRAM
- VX900 .26 Screen Pitch 19" Monitor (18" viewable)
- 8MB AGP Graphics Accelerator
- 10GB Ultra ATA Hard Drive
- DVD-ROM Drive & MPEG2 Decoder
- SoundBlaster AudioPCI 64V
- Boston Acoustics BA635 Speakers
- U.S. Robotics 56K[4] Voice Winmodem
- Mid-Tower Case
- MultiFunction Keyboard & MS IntelliMouse
- Microsoft Windows 98 & MS Home Essentials Software
- Gateway Gold Service** for G-Series PCs
- As low as **$69/mo.** for 48 mos. or $2479*

Optional additions

All these add-ons are available when you purchase a Gateway system.

Finance Pack Software ($69)

Family Reference Software ($79)

Visioneer® PaperPort™ 6100 Scanner ($179)

Iomega® 100MB Internal ZIP® Drive ($99)

HP® 722Cse Color Ink Jet Printer ($299)

Epson® PhotoPC™ 550 Color Digital Camera ($249)

Voodoo2™ Card with Extreme Gaming Software ($249)

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The Capacity To Do More™ with your PC.
It's today's standard in high-capacity removal storage.
Exchange and carry your files anywhere.
Organize and protect more of your stuff.

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The Dream Machine

G6-400

- Intel Pentium II Processor 400MHz with 512K Cache
- 64MB SDRAM
- EV700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- 8MB AGP Graphics Accelerator
- 10GB Ultra ATA Hard Drive
- DVD-ROM Drive & MPEG2 Decoder
- SoundBlaster AudioPCI 64V
- Boston Acoustics BA635 Speakers
- U.S. Robotics 56K[4] Voice Winmodem
- Mid-Tower Case
- MultiFunction Keyboard & MS IntelliMouse
- Microsoft Windows 98 & MS Home Essentials Software
- Gateway Gold Service** for G-Series PCs
- As low as **$56/mo.** for 48 mos. or $1999*

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Let's talk about the ultimate traveling companion.

On the road again? We'll build you a portable with all the power and features of a desktop PC. So you can do spreadsheets, send e-mails, make presentations and more, to make you just as productive as back at the office. You can even play games and watch DVD movies to make traveling more fun. The Solo® 2500 and 9100 each won the August '98 ***PC Magazine*** **Editor's Choice** award, and the Solo 2500 won the magazine's **Best Buy Award** as well. With the best portables on the market, it's just one more reason customers who buy another computer come home to Gateway.

The latest thing in portables

Every Gateway client is unique, and so is every Gateway PC. The systems here are just examples of what we can build for you.

King of the Road Solo 5150LS

- 14.1" XGA TFT Color Display
- Intel® Pentium® II Processor 233MHz with 512K Cache
- 64MB SDRAM (expandable to 160MB)
- 2.5MB 256-Bit Graphics Accelerator
- Modular DVD-ROM Drive & 3.5" Disk Drive
- 4GB Ultra ATA Hard Drive
- Lithium Ion Battery w/ Bty Gauge & AC Pack
- 2 USB Ports, CardBus & Zoomed Video Support
- NTSC/PAL Video Output
- Integrated 16-Bit Sound & Stereo Speakers
- TelePath® 56K[4] Modem for Windows
- Deluxe Leather Case
- EZ Pad® Pointing Device
- Microsoft® Windows® 98 & MS® Office 97, Small Business Edition plus Bookshelf® 98
- LapLink® V.7.5 for Windows 98 & McAfee® VirusScan
- Gateway Gold℠ Service** for Portable PCs
- As low as **$81/mo.** for 48 mos. or $2899*

The Portable Desktop Solo 9100LS

- 14.1" XGA TFT Color Display
- Intel Pentium II Processor 266MHz with 512K Cache
- 64MB SDRAM (expandable to 192MB)
- 4MB SGRAM 3-D Graphics Accelerator
- Modular DVD-ROM Drive & 3.5" Disk Drive
- 6GB Ultra ATA Hard Drive
- Lithium Ion Battery & AC Pack
- 2 USB Ports, CardBus & Zoomed Video Support
- NTSC/PAL Video Input & Output
- 16-Bit Wavetable Sound & Altec Lansing® Speakers
- TelePath 56K[4] Modem for Windows
- Deluxe Leather Case
- EZ Pad Pointing Device
- Microsoft Windows 98 & MS Office 97, Small Business Edition plus Bookshelf 98
- LapLink V.7.5 for Windows 98 & McAfee VirusScan
- Gateway Gold Service** for Portable PCs
- As low as **$95/mo.** for 48 mos. or $3399*

Other goodies

All these add-ons are available when you purchase a Gateway system.

Canon® BJC®-80 Color Bubble Jet Printer ($299)

Kensington® Saddlebag ($79)

MS Professional Resource Suite ($99)

PC Card Modem with Cellular Support ($50 upgrade from Winmodem)

Kensington Master Lock® ($39)

gateway.net℠ $14.95/mo.[3]

Frequent Flier

Solo 2500SE

- 12.1" TFT Color Display
- Intel Pentium Processor with MMX™ Technology 200MHz
- 32MB SDRAM (expandable to 160MB)
- 2MB Graphics Accelerator w/ 64K Colors
- Integrated 8X min/20X max CD-ROM Drive & 3.5" Disk Drive
- 2GB Ultra ATA Hard Drive
- NiMH Battery & AC Pack
- USB Ports, CardBus & Zoomed Video Support
- NTSC/PAL Video Output
- Integrated 16-Bit Sound & Stereo Speakers
- TelePath 56K[4] Modem for Windows
- Casual Case
- EZ Pad Pointing Device
- Microsoft Windows 98 & MS Home Essentials™
- LapLink V.7.5 for Windows 98 & McAfee VirusScan
- Gateway Gold Service** for Portable PCs
- As low as **$50/mo.** for 48 mos. or $1799*

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Let's talk about your own way of doing business.

You run a tight ship. How do you keep up with the latest technology without buying equipment you don't need? With Gateway™ business-class computers. Gateway was named one of the top two **Best Computer Mail-Order Companies** by July '98 ***PC World***. And the GP6-450 features the fastest Pentium® II processor yet. We'll upgrade your office with computers that are customized with the hardware, software and networking components you need. At an affordable price. And with free 24/7 technical support that lasts for as long as you own your system. That's why small companies are big fans of Gateway.

PCs with your name on them

Every Gateway client is unique, and so is every Gateway PC. The systems here are just examples of what we can build for your business.

The Associate GP6-333C

- Intel® Celeron™ Processor 333MHz with 128K Cache
- 64MB SDRAM
- EV500 .28 Screen Pitch 15" Monitor (13.9" viewable)
- 4MB AGP Graphics Accelerator
- 6.4GB Ultra ATA Hard Drive
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- GoldValue Lease **$46/mo.** for 36 mos. or $1299*

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- 8MB AGP Graphics Accelerator
- 13GB Ultra ATA Hard Drive
- 13X min/32X max CD-ROM Drive
- Mid-Tower Case
- 10/100 Ethernet Network Card
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Let's talk about working on a presentation at 3 a.m. with technical support standing by.

Businesses stick with Gateway because we stick with them. We give your company free 24/7 service and support that lasts for as long as you own your systems. And no matter what size your business is, we'll provide customized solutions complete with hardware, software, and peripherals, all at affordable prices. It's no surprise that the August '98 ***Small Business Computing*** ranked Gateway one of the top three technology vendors for small business. Let's talk about what we can do for yours.

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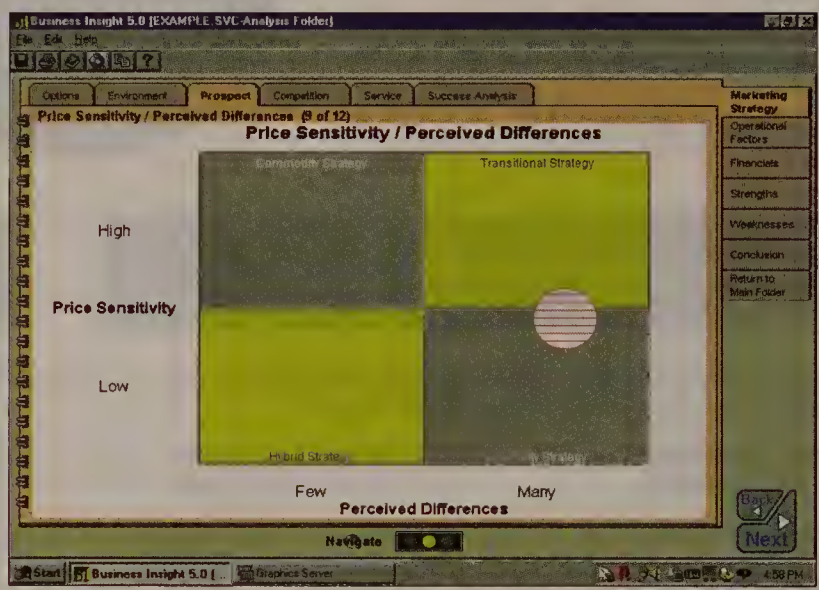
Business Profit-Building Aids

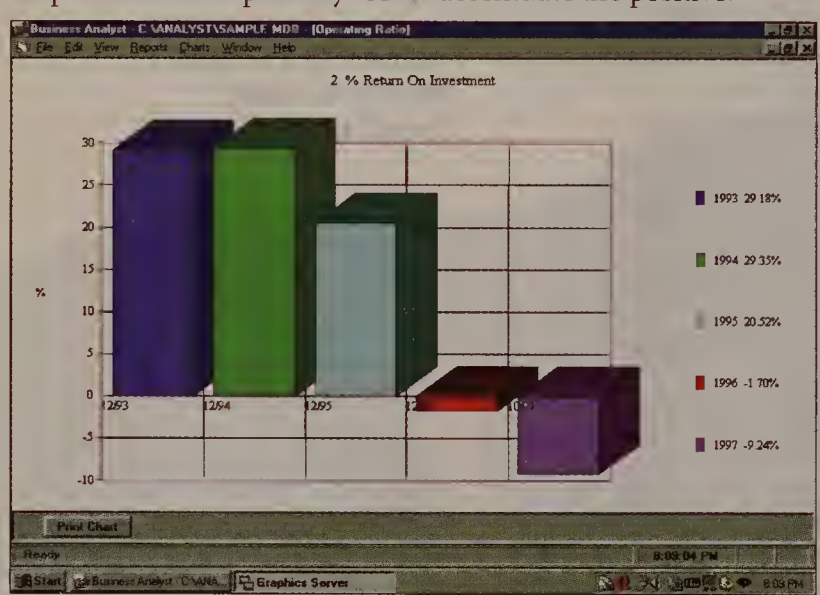
M B A W A R E

EVERY BUSINESS wants to increase profits, and two new programs promise to help managers achieve this goal, in different ways. Business Resource Software's **Business Insight 5.0** offers advice on starting a new business or expanding an existing one; Hi-Val's **Business Analyst 3.5 Pro** uses your existing financial data to make suggestions for improving performance. Although both have drawbacks, they can help managers with limited financial expertise.

Based on your responses to 60 questions about your enterprise—the capability of your managers, for example—Business Insight identifies the strengths and weaknesses in your approach. It delivers this information in an impressive array of text, graphs, and numeric analyses that you can also use in financing proposals (though you'd want to weed out unfavorable information and customize the boilerplate). But the program's usefulness depends on the quality of your judgment: If you tend to look at the world through rose-colored glasses, your report is likely to overaccentuate the positive.



BUSINESS INSIGHT displays your preferred marketing strategy.



BUSINESS ANALYST charts financial trends clearly.

For that reason, Business Insight can't replace the seasoned judgment of a good business consultant. For the program's $795 price, however, you'd be hard-pressed to retain a consultant for more than a few hours.

Business Analyst slices and dices the finances of an existing business. It charts trends, calculates ratios, and compares the results to those of similar businesses. You can enter your financial records directly or import them from most accounting programs.

Unfortunately, Business Analyst offers little actual advice: You'll need to look at the numbers and figure out what changes will improve profitability. You could do most of these comparisons using a spreadsheet and built-in reports in accounting programs such as QuickBooks—an approach that's probably cheaper and more flexible, since it lets you design your own calculations and reports.

Business Analyst does include a database of statistics for specific industries, which you'd otherwise have to research on your own. And if you don't know how to use a spreadsheet or want to learn, Business Analyst is a reasonably priced tool. For most managers, however, Insight offers better value, even at its considerably higher price.

—*Richard Morochove* ▶

Business Analyst 3.5 Pro

PRO: Easy analysis of business financial results.

CON: Does little more than a good accounting program and a spreadsheet.

VALUE: Good value if you don't know how to use a spreadsheet.

Street price: $150

Hi-Val (Red Flag Software)

888/473-3352

www.hival.com

INFONET NO. 745

Business Insight 5.0

PRO: Highlights strengths and weaknesses in a business plan.

CON: Qualitative analysis depends heavily on subjective judgments rather than on numbers.

VALUE: Provides a cheap alternative to a consultant.

List price: $795

Business Resource Software

800/423-1228

www.brs-inc.com

INFONET NO. 746

QUICK TAKES

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SAVVY BUSINESS-card collectors don't type all those names and numbers into their contact manager—they use a card scanner to do the job. The latest release of Corex's popular CardScan software makes this job easier than ever. The Intellisync feature alone is worth **CardScan 4.0's** $79 street price ($69 upgrade); it synchronizes CardScan data with more than a dozen contact managers. A preproduction copy synchronized flawlessly with my ACT 4.0 and Lotus Notes 4.5 address books. Also new: expanded search capabilities, better PalmPilot synchronization, and Windows CE support. The software and Corex's petite CardScan300 scanner go for $260—a good deal for a package that saves space and time. Corex Technologies; 800/261-6329; www.cardscan.com

INFONET NO. 750

—*Yardena Arar*

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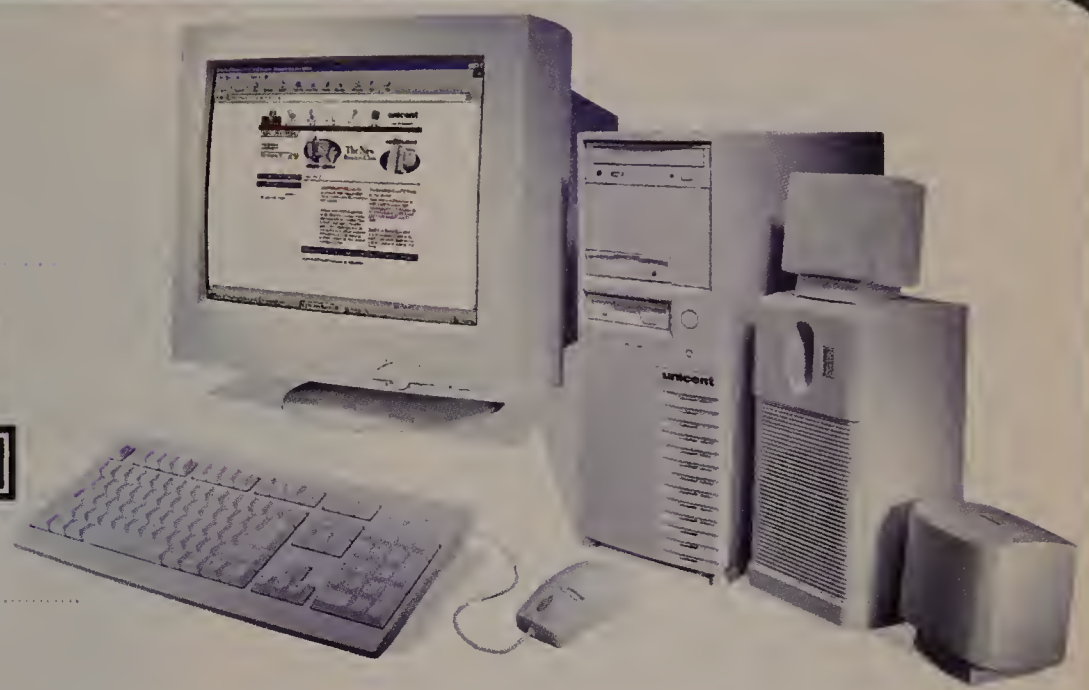

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- MS Windows 98/IntelliMouse
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Two New Power-Problem Protectors

UPS

FOR MOST PEOPLE, computer security means protection from viruses and hackers. But your data and equipment could suffer equally severe damage from a seemingly innocuous source—your power line. Electrical blackouts and brownouts can demolish hours' worth of work, and power surges and spikes can destroy an entire system. That's why a good uninterruptible power supply with surge suppression ability can save you lots of money and considerable aggravation.

Two new models—Tripplite's **Internet Office 500** and Guardian on Board's **PowerCard**—provide temporary backup power, giving you 8 to 25 minutes to save your data and shut down your system normally; they also guard against surges on phone or data lines. Both include software for automatic shutdown if you're not around during a power loss.

The $159 Tripplite is about the size of a bookshelf speaker, weighs a hefty 16 pounds, and could sit on or under your desk. In my tests with a Pentium II-333–based Dell with 64MB of RAM and a 17-inch ViewSonic monitor, a shipping version of Internet Office 500 delivered 15 minutes worth of backup power, while the PowerAlert software (which is supposed to work with any UPS device) saved all of the open documents and safely shut down the computer.

TRIPPLITE'S Internet Office 500 can protect six devices from surges and spikes.

Internet Office 500 can protect six devices at a time from electrical noise, surges, and spikes and provide backup battery power to three of the six. A door offers ready access to the battery (the manufacturer says it should last three to five years). Tripplite guarantees up to $25,000 of connected equipment. In contrast, APC's comparably priced Back-UPS 500 protects only two outlets from data loss, and a third from power surges.

The intriguing $199 PowerCard fits inside your PC: It occupies an ISA slot (a PCI version should be available by the time you read this), and it also requires an IRQ address. Powered by a lightweight nickel cadmium battery, this UPS can protect three devices from data loss and power surges; Guardian on Board guarantees up to $50,000 worth of connected equipment. A preproduction version of the PowerCard kept my Dell PC and monitor running for just under 9 minutes after I pulled the plug—ample time to save files and shut down. The shutdown software included with this UPS—PowerMon II—completed this job efficiently.

The PowerCard costs more than a conventional UPS such as Internet Office, and it needs a slot that you might prefer to save for other devices. Still, if office space is scarcer than internal card openings are, the PowerCard might be worth the premium you pay for its petite profile.

—*Cameron Heffernan* ▶

Internet Office 500

PRO: Low price, six protected outlets, shutdown software works with non-Tripplite devices on a network.

CON: Bulky.

VALUE: Solid choice, especially for those seeking a program to protect diverse UPSs on a network.

Street price: $159

Tripplite

www.tripplite.com

773/869-1234

INFONET NO. 746

PowerCard

PRO: Internal UPS requires no desk or floor space.

CON: Limited battery life, pricey, protects fewer outlets than Internet Office, gobbles up a scarce ISA slot and IRQ.

VALUE: Makes sense only if you don't have space for a regular UPS.

Street price: $199

Guardian on Board

www.guardian-ups.com

INFONET NO. 747

QUICK TAKES

Seagate Backup Does CDs

OUCH! Your PC's crashed, and you must reinstall your OS and apps and restore your data. With Seagate's $99 **Backup Exec Desktop 98** ($29 upgrade), you'd be prepared. Enhanced for Windows 95 and 98, it now supports CD-R and CD-RW, compressing up to 1.3GB of data onto each 650MB disc. The Emergency Restore feature offers pure—if not instant—deliverance. When I wiped out all 1.2GB data on my hard drive, restoring everything from my parallel-port tape drive (after booting from my emergency floppy) took 3 hours—but I didn't have to reinstall a single application to get my PC back to normal. Backup Exec may not be the cheapest utility in its category, but its features and ease of use make it the best one. Seagate Software; 800/327-2232; www.seagatesoftware.com

INFONET NO. 751

—*Rex Farrance*

From Flash to Floppy

TINY SSFDCs (Solid State Floppy Disk Cards) are convenient storage media for PDAs, digital cameras, and the like, but transferring the data to a PC can be a hassle. SmartDisk's $100 **FlashPath**—a floppy disk look-alike with a slot for SSFDCs—makes the job easy. Install a driver on your PC, slip the SSFDC into the FlashPath's slot, put the FlashPath into a floppy drive, and read the data just as you would a conventional floppy. (Note that FlashPath does not work with CompactFlash cards.) The FlashPath is powered by standard lithium watch batteries. SmartDisk; 941/643-1500; www.smartdisk.com

INFONET NO. 752

—*Michael S. Lasky*

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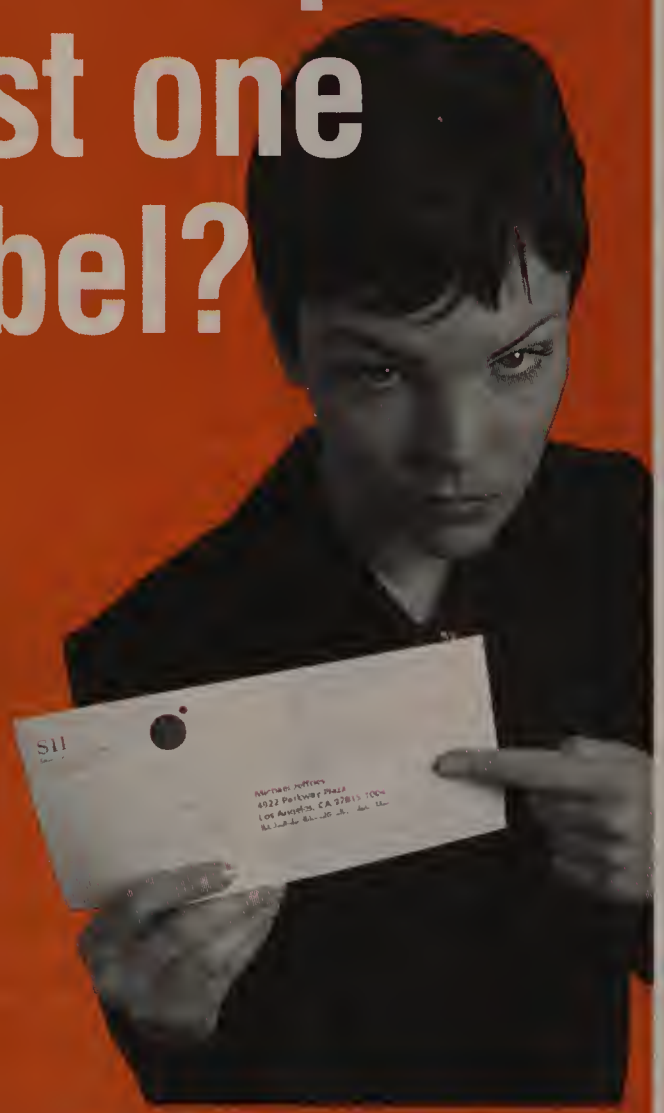

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Fast, Easy Scanners From HP, Umax, Visioneer

SCANNERS

WITH THE LONG-AWAITED arrival of Windows 98 and its full-blown Universal Serial Bus support, a new generation of USB peripherals promises to deliver easier installation and faster data flow. Based on my tests of the first USB scanners from Hewlett-Packard, Umax, and Visioneer, I am happy to report that USB delivers on its promises.

I looked at a preproduction model of Hewlett-Packard's **ScanJet 4100Cse** and shipping versions of Visioneer's **PaperPort 3100 USB** and Umax's **Astra 1220U.** All three units are compact, lightweight flatbeds, designed and priced (at under $200) for small-business and home users.

At $130, the Visioneer is the cheapest of the bunch. It delivers 30-bit color and optical resolution of 300 by 600 dots per inch. It comes with Visioneer's acclaimed PaperPort scanning and document management software; a basic but adequate optical character recognition program; and PictureWorks PhotoEnhancer software for image editing.

The $199 ScanJet 4100Cse and the $179 Astra 1220U provide greater depth of color (36-bit) and higher resolution (600 by 1200 dpi) than the Visioneer, thereby justifying their higher prices. Both of them come with Adobe PhotoDeluxe 2.0 (a more robust image editor than PhotoEnhancer), Caere OCR software, and photocopier utilities. The Umax also offers a transparency adapter as a $179 option.

USB SCANNING SUPERSTAR: Umax's Astra 1220U delivers quality scans much faster than a parallel-port scanner and costs only $179.

Hooking up each scanner was a cakewalk: When I attached the cables, Windows 98 noted the new hardware, automatically searched for the drivers, and installed them. Any of these units are easier to install and operate than a scanner with a parallel-port hookup, let alone one requiring a SCSI interface card.

The manufacturers say these USB scanners perform 20 to 50 percent faster than their parallel-port–based siblings (depending on such factors as scanning mode and reso- ▶

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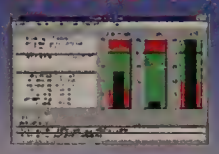

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HP'S SCANJET 4100Cse is easy to use, but it's slower and $20 more expensive than the Astra 1220U, which delivers comparable scans.

lution), but slower than SCSI-card scanners (which tend to be more expensive).

In my tests, these USB scanners did outpace a comparable parallel-port model (HP's 30-bit OfficeJet Pro 1175Cse). The Visioneer was the speediest, followed by the Umax and then the HP. For example, scanning an 8.5-by-11.5-inch gray-scale photograph at 300 dpi took about 40 seconds with the Visioneer, 70 seconds with the Umax, 114 seconds with the HP 4100Cse—and a whopping 486 seconds with our comparison parallel-port scanner. The Umax's and HP's color scans both outshone the Visioneer's, however.

If you're on a tight budget, the Visioneer is a good choice. Otherwise, the higher-quality images you get from the Umax and HP scanners make these units worth the extra $49 or $69. HP's scanning software is the easiest to use for novices, who might be overwhelmed by Umax's more sophisticated controls (such as gamma correction and tone adjustment). I'd recommend the Astra for savvy users who want maximum control over image quality.

—Richard Jantz ■

Astra 1220U

PRO: Quality 36-bit color scans; optional transparency unit.
CON: Scan control options may confuse novices.
VALUE: Best-quality color scans for a USB scanner.
Street price: $179
Umax Technologies
800/562-0311
www.umax.com
INFONET NO. 740

ScanJet 4100Cse

PRO: Good 36-bit color scans, easiest-to-use scanning software.
CON: Expensive, slower than other two USB scanners.
VALUE: High-grade color scans for novices, at a small premium.
Street price: $199
Hewlett-Packard
800/722-6538
www.hp.com
INFONET NO. 741

Visioneer PaperPort 3100 USB

PRO: Good price, fast.
CON: Scans have lower color depth and resolution than with more expensive models.
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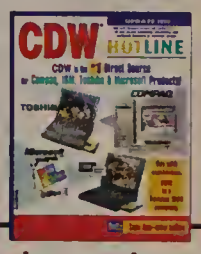

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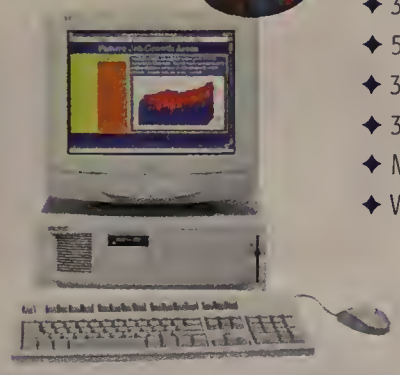

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THE Trouble-Free PC

TIPS, TWEAKS, AND TROUBLESHOOTING TACTICS

BY JIM ASPINWALL, HARRY McCRACKEN, AND STAN MIASTKOWSKI

SO IT'S NOT THE LATEST 400-MHz SCREAMER. But that Pentium-166 snapped and sizzled the first time you started it up. Now, it walks like a zombie, and the hourglass cursor dogs your every click. What happened?

Processor, RAM, and storage upgrades could put your old system back on the fast track. The key is knowing when to stop: In the age of $800 PCs, hardware upgrades that cost almost as much as a new system are difficult to justify. Fortunately, upgrading isn't the only way to give your PC a midlife boost. If your drive dawdles or you've got a slow-motion modem, *PC World*'s hardware experts can lend a hand. While we're at it, we'll offer insights into troubleshooting and configuring recalcitrant ports and peripherals that can hamstring even the most up-to-date systems. And for you early Windows 98 adopters out there, we have tips on keeping your hardware running great on Route 98. ▶

ILLUSTRATIONS BY BRYAN LEISTER

A Sleeker System

Overclock at Your Own Risk

The Web is rife with information about overclocking your PC—adjusting the jumpers on your PC's motherboard to increase the speed of your processor. For example, if you have a Pentium-166, you could set jumpers to indicate that a Pentium-200 is installed. Yes, it's possible (see July's *Got a Problem?* column for details), and many dedicated hobbyists do it with abandon. But unless you're willing to risk destroying your processor and voiding your computer's warranty, don't do it. **–S. M.**

Video RAM Upgrades–Think Twice

Have you recently bought a color scanner, a larger monitor, or a new application that calls for using more than 256 colors? If so, the 2MB graphics adapter that came with your system a few years ago probably looks mighty long in the tooth. Your first impulse might be to add a couple of megs of video RAM to the card. But before you try that, compare the cost of the upgrade with the price of an entirely new graphics adapter.

You'll probably have to fork over between $50 and $100 to upgrade an old card from 2MB to 4MB of VRAM. That's not a wise investment, considering that for about $100, you can get a new PCI video card with performance and features your old one can't match, even after a RAM upgrade. If you have a 486 or an early Pentium system with an older VESA local bus motherboard or ISA bus slots only, save your upgrade dollars for a new computer. **–H. M.**

When to Upgrade Your BIOS?

Your computer's Basic Input/Output System is the software that controls the PC's most basic functions—how the CPU communicates with system memory, drives, display, and keyboard. Occasionally, it makes sense to download and install an updated BIOS to support larger (or EIDE) hard disks, a password security feature, additional setup options, and even Plug and Play. On some older Pentiums and 486 systems, the BIOS upgrade may be packaged as a chip, requiring physical installation.

In some instances, system manufacturers will find a bug (including year 2000 and Windows 98 incompatibilities) in the system and release a patch. In other cases, BIOS updates add new features (such as USB device support, or support for larger hard disks). Check your system vendor's Web site to see whether an update is available for your system. Third-party vendors such as Unicore Software and Micro Firmware sell BIOS upgrades for many common motherboards. In addition to providing EIDE support, Unicore's MR BIOS upgrades add several nifty features that a standard BIOS may not support, such as the ability to boot your system from a specific hard disk. A number of MR BIOS users have reported that it boots faster, too. **–J. A.**

- **MR BIOS upgrades** $50-$70; Unicore Software; 800/800-2467; www.unicore.com/rombios.html

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- **BIOS upgrades** $59-$79; Micro Firmware; 800/767-5465; www.firmware.com

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PC Housecleaning

To prevent dust from clogging your system's fans and coating its temperature-sensitive electronics, at least twice a year open up your PC and blow it out with a can of compressed air. (Don't poke around with a vacuum cleaner—you're liable to disconnect cables or damage something.) Avoid holding the can upside down, though, or you'll spray refrigerant instead of air. Between cleanings, check the fan on your PC's power supply regularly, and use your canned air to keep it clear. This fan, usually visible through a grid on the rear of the case, is where dust is most likely to build up. **–S. M.**

PHOTO: STAN MUSILEK

KEY TO ICONS

No-brainer This tip's easy to try, even if you're allergic to hardware tweaking.

Under the hood This tip may require opening the computer's case or changing complex device settings.

Deep Storage Secrets

Give Your New Drive the Boot

You've just purchased a hot new IDE hard drive. Now, to get the full performance benefit, you need to make sure that you install this bigger and faster drive as your boot (C:) drive, and that you make the old hard disk your D: drive. Copying everything from the old drive to the new one is not nearly as simple as it may sound. A boot drive on a system running Windows 95 is packed with system and hidden files that have to be transferred to the new drive.

In the days of MS-DOS, people used the xcopy utility to copy one drive to another. But getting Windows 95's version of xcopy to do the same thing is tricky. Fortunately, most new hard drive upgrade kits come with a utility that quickly partitions and formats your hard drive, copies all the contents of your old drive to the new one, and makes the drive bootable. If your new

drive doesn't include one of these kits, buy PowerQuest's $30 Drive Copy, Micro House's $15 EZ-Copy, or Symantec's $80 Ghost. All three automate the process and get you up and running in short order.

After you've done the copying, you need to jumper your new drive as the master, and your old drive as the slave. Follow the directions that accompany the software and the data sheets that come with the drive. For an in-depth discussion of hard disk upgrades, see "Things to Do Before and During Your Hard Disk Upgrade" (July, page 152). **–S. M.**

• **Drive Copy** $30; PowerQuest; 800/379-2566; www.powerquest.com

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• **Ez-Copy** $15; Micro House; 800/926-8299; www.microhouse.com

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INFONET NO. 724

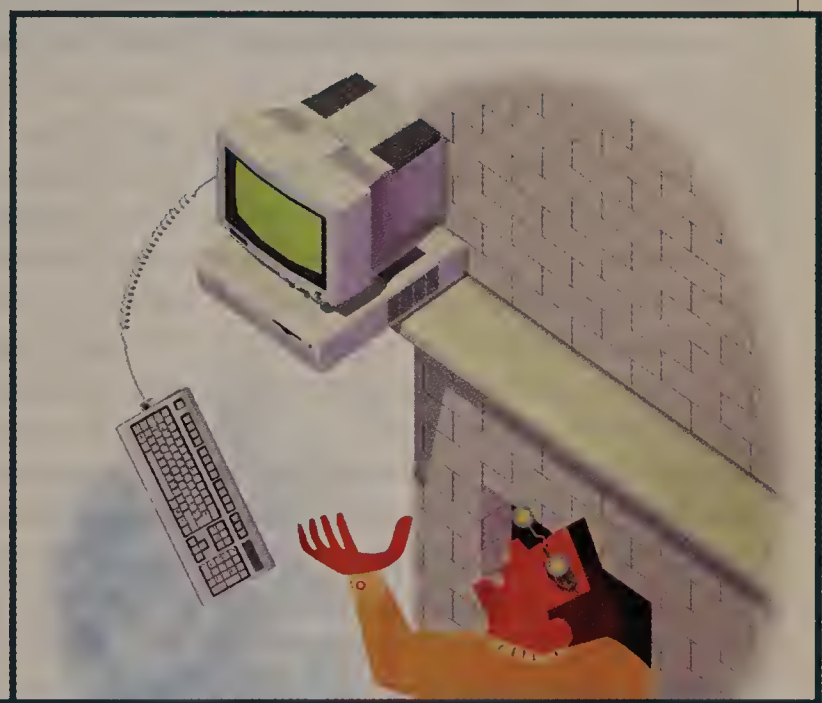
Repartition for Disk Efficiency

We've said it before and we'll no doubt say it again: FAT16 wastes disk space. The newest generation of hard disk drives offer incredible amounts of storage space for just pennies per megabyte. But regardless of how large your hard drive is, allocating the entire drive as a single partition (drive letter) can cause your system to waste hundreds of megabytes of storage space. That's because the large partitions of FAT16 (the default file system used by MS-DOS, Windows 95, and Windows 98) assign file space in chunks called allocation units, and each unit is the same size. For hard drive partitions that are larger than 1GB, the unit size is 32KB. Every file on your hard disk eats up at least one unit even if the file itself is only 1KB.

If you have Windows 95 OSR2 or Windows 98, you may be able to save tens or hundreds of megabytes of precious storage space by converting your drive from the pudgy old FAT16 file system to the svelte new FAT32 system (see "Slim Down With FAT32," next page). Otherwise, consider repartitioning into smaller drives with smaller cluster sizes. For example, 512MB partitions use 8KB clusters. But repartitioning isn't for the faint of heart. Because it destroys the data on your hard drive, you have to make a full backup—and then a boot floppy or start-up disk that contains the Fdisk and Format programs. To shrink or resize existing disk partitions without destroying data, use PowerQuest's indispensible Partition Magic. **–S. M.**

• **Partition Magic** $70; PowerQuest; 800/379-2566; www.powerquest.com/product/pm

INFONET NO. 725



BRING YOUR PC BACK FROM THE BRINK

You don't have to be a hardware expert to recover from a digital near-death experience.

SYMPTOM	DIAGNOSIS	TREATMENT
You experience frequent system crashing or Windows general protection faults.	Poorly seated CPU, CPU fan, or RAM.	Power off the system, open the chassis, and reseat the CPU in its socket. Remove and reinstall RAM. Turn on the system and check that the CPU fan is firmly attached and turning.
You turn on the system, but nothing shows up on the screen.	Poor monitor cable connection or dead monitor.	Make sure monitors and power cables are firmly attached, monitor power is on, and brightness is turned up. Try the monitor on another computer to confirm that it needs repair.
No boot disk is found when you power on the system, or the CD-ROM drive is unavailable.	Loose or disconnected drive cables.	Power off the system, open the chassis, and check that data ribbon cables are firmly connected to both the motherboard and the drive. Check that a power cable connects to each drive.
Keys stick or repeat.	Key switches encumbered with dust, hair, or other debris.	Using a pen or pencil, gently pry off the cap of the offending key, blow out any detritus with compressed air, and replace the cap. If that doesn't help, consider buying a new keyboard.
System is hot to the touch and locks up or starts crashing several minutes after being powered on.	Dead or dust-clogged system fan.	Open the system, and blow dust and debris out of the chassis and power supply using compressed air. Replace the power supply if the fan is dead or makes a grinding sound.
ScanDisk regularly finds new bad sectors on your hard disk.	Failing hard disk.	Back up your data and install a new drive.

Slim Down With FAT32

If your PC is running Windows 95 OSR2.*x* (shipped with most new PCs from mid-1997 to mid-1998), you can get around FAT16's wasteful ways by switching to the more efficient FAT32 file system. (To find out if you have OSR2 or later, select *Start•Settings•Control Panel*, and double-click the System icon. If the System entry beginning 'Windows 95 4.00.950' ends in B, then you have OSR2.*x*.) For partitions as large as 8GB, FAT32 uses modest 4KB clusters, which can free up hundreds of megabytes. The only way to convert your FAT16 partition to FAT32 in OSR 2.*x* is to back up, repartition, format, and restore your drive contents. If you don't want to go through all that, use a third-party tool like Partition Magic to convert from FAT16 to FAT32. Windows 98 makes it easy: just choose *Start•Programs•Accessories•System Tools•Drive Converter (FAT32)* to launch the conversion program. **–S. M.**

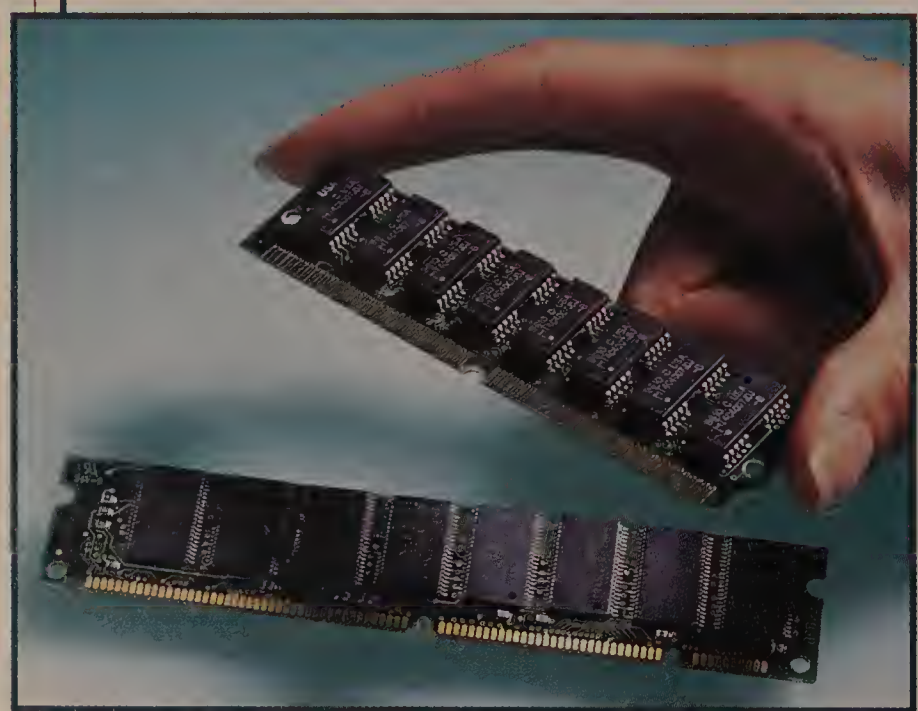
HOW MUCH RAM CAN I CRAM?

There's nothing like adding RAM to kick up the performance of a PC, especially if you're running Windows 95 or 98. To avoid disk-swapping delays, consider 16MB an absolute minimum; 32MB is ample for most tasks, but 48MB or even 64MB can speed up memory-intensive graphics work. To find out much how much RAM you have now, choose *Start•Settings•Control Panel*, and double-click the System icon. You'll find the amount of memory in your PC listed at the bottom of the General page.

To determine how much RAM your PC can accept, read its documentation or call the vendor's tech support number. If neither source has an answer, you can probably figure it out through visual inspection. Start by turning off your PC and removing the cover. Most PCs made in the last seven or eight years use Single Inline Memory Modules that plug into motherboard slots. Find the SIMMs (they're usually mounted toward the front of the case). Most motherboards have four SIMM slots. SIMMs must be installed in matching pairs. Thus, if you have 16MB of RAM and find two SIMMs installed, each is an 8MB unit.

Currently, 16MB SIMMs are the most common and (at about $25 each) the most economical type. In this example, installing 16MB SIMMs in the two empty slots yields a system with 48MB of RAM. But it also hampers future upgrades: To upgrade to 64MB later, you'd have to remove the original pair of 8MB SIMMs (and find a use for them) and then install another pair of 16MB SIMMs in their place.

Dual Inline Memory Modules are easier to work with. You don't have to install them in pairs, so you can buy a single DIMM to satisfy your current memory needs, while leaving room for future expansion. Most Pentium II motherboards have DIMM sockets only. Recent Pentium motherboards may offer both DIMM and SIMM sockets, but you have to choose one: You can't mix DIMMs and SIMMs.



DIMM OR SIMM? That's the first question to ask when upgrading your PC's memory. The SIMM is the module shown on the bottom.

The Right RAM

Once you've figured out how much RAM you need, get the right kind. Like many supposedly generic PC components, RAM is far from universally interchangeable. The manual or the vendor may report that your PC needs 72-pin EDO SIMMs or 168-pin Synchronous DRAM DIMMs—but that doesn't mean it will take any memory module that meets those specs. Dell's Dimension XPS P*xxx*s series, for instance, uses SDRAM—but the company advises owners to stick to memory upgrades that use certain chips. And though SIMMs are fairly standard, DIMMs vary in size and slot configuration, so check with your PC or RAM vendor to make sure you buy a DIMM that your motherboard specifically supports.

RAM speed is less of a concern. The 100-MHz system bus on new PII-400 and faster systems need PC100 memory. Other Pentium and Pentium II systems work fine with either 50-ns or 60-ns RAM. You can always use faster RAM than the original system specs call for, but you'll reduce your likelihood of encountering memory problems if all SIMMs have the same speed.

The surest way to avoid problems is to buy memory upgrades designed specifically for your particular PC, but that doesn't mean you must buy the pricey upgrades sold by computer manufacturers themselves. Third-party memory vendors such as Kingston (www.kingston.com), PNY (www.pny.com), and VisionTek (www.visiontek.com) offer hundreds of upgrade kits that are designed for different PC models. For more details on how to perform RAM upgrades, see June's *Upgrade Guide*. **–H. M. and S. M.**

Floppy Emergency Rescue

Floppy disks are fragile. Their metal shutters easily bend out of shape, fall off the tracks that keep them in place, or otherwise malfunction. That can be alarming if the disk contains your only copy of a vital document—and it's even worse if the loose shutter jams your PC's floppy drive.

To salvage data from a 3.5-inch floppy with a damaged shutter, first remove the shutter: Hold it with a finger on one side of the disk, carefully bend it back on the other side, and lift it off the floppy case, without touching the exposed disk. A small spring may fall loose; make sure it doesn't touch the disk either.

Once you've removed the shutter, the disk will be highly susceptible to damage, but it should still work. Copy its contents to your hard disk or to another floppy right away. **–H. M.**

Saved by DriveSpace 3

If you're hurting for disk space but want to avoid the expense and hassle of installing a new disk drive, you have two choices: Move files off your hard drive and on to floppies, Zip disks, or other media; or use Microsoft's DriveSpace utility to compress the contents of your hard disk. We recommend that you use DriveSpace 3, the version of the compression software included in Windows 95 OSR2 and later. Users of earlier Windows 95 releases should look for the discontinued $50 Microsoft Plus Pack, which also includes the utility. You'll need some free space to start with. On average, setting aside 30MB to 50MB of free space gives the utility enough room to work and saves some uncompressed space for system and swap files. DriveSpace 3 provides one other major benefit: Like FAT32, it stores files more efficiently than FAT16. **–J. A.**

Careful With That CD

CDs and CD-ROMs are more delicate than they look. You probably know not to write or mark on the bottom (shiny side) of a CD; scratches there can render the disc unreadable. But the top of the CD is nearly as vulnerable. Never write on the top with a sharp pen—the point will go right through the thin coating that covers the encoded data. Alcohol-based pens (the pungent-smelling kind) can destroy CD-Recordable discs, too. If you need to label a CD, use a labeling kit made especially for the purpose (they cost about $30). **–J. A.**

Wake Up, Little Hard Disk

Here's a maddening PC problem: Every so often, your PC freezes for 10 or 15 seconds, and even your mouse cursor fails to function. Eventually, you hear your hard disk whir into action, and you regain control of the system. Why did the disk go into temporary hibernation? Probably because your PC's power-management settings told it to shut off after a specified period of inactivity. This makes sense with notebook computers that rely on battery power; but with desktop PCs the productivity you lose isn't worth the minimal power you conserve.

You can usually adjust a hard drive's power-management setting in your PC's BIOS. Enter the BIOS's setup program (read the manual or watch your computer's screen as it boots up, for the keystrokes that take you into the program), and look for a Power Management section; within this, there should be a Hard Disk section where you can disable the shutdown feature. Alternatively, you may be able to specify a longer period of inactivity that must pass before the PC turns off the drive. And don't forget to check the settings in Control Panel's Power or Power Management applet. The utility's settings vary depending on which version of Windows you have, but each lets you prevent drive shutdown. **–H. M.**

Make Scratched, Dirty CD-ROM Discs Play

Uh-oh: You've put your office-suite CD-ROM disc in your drive, and an error message says it's unreadable. Don't panic: A quick cleaning can bring it back to life. Put a few drops of water on a lint-free cloth and gently wipe the data (nonlabel) side of the disc in a straight line from its center to its edge. Once it has dried, put it back in the CD-ROM drive and try again.

If that doesn't help, the disc may have a bad scratch. Fix it with Memorex's CD-ROM Scratch Repair Kit or Esprit Development's WipeOut. To protect CD-ROM discs, handle them by their edges, and keep them in their cases when not in use. **–H. M.**

- **CD-ROM Scratch Repair Kit** $10; Memorex; 800/636-8352; www.memorex.com

INFONET NO. 726

- **WipeOut** $15; Esprit Development; 908/284-0426; www.cdrepair.com

INFONET NO. 727

Perfect Your Peripherals

Are You the Clean Type?

Cleaning a keyboard is tricky. First, power off the computer, then disconnect the keyboard, turn it upside down and shake out all the loose bits of paper, hair, and croissant. Spray compressed air between the keys to blow out stubborn debris. To clean the key caps, spray window cleaner on a cloth (not directly on the keyboard) and wipe away the grime. Keep water and chemicals out of the guts of the keyboard to avoid damaging the switches and electronics. Only as a last resort (if you've spilled a cup of coffee onto it, for instance) should you immerse the keyboard in warm water—most keyboards don't work well after this treatment. Be sure it's thoroughly dry before you plug it back in. **–J. A.**

Coordinate Your Cords

Unless you're Felix Unger, you have a rat's nest of cords, cables, and power bricks hanging off the back of your PC. After you've unplugged your PC and all its peripherals to open the PC's case or move the system around, figuring out what needs to be reconnected where can be a real hassle. It can be dangerous, too: Plugging the wrong power cord into a peripheral can *destroy* the device. Modems, keyboards, printers and SCSI peripherals—not to mention your motherboard—are susceptible to this kind of damage.

To simplify things, color-code your cords and cables. You can buy kits designed for this purpose, but ordinary colored peel-off stickers work nearly as well. Just apply the stickers to cables and to the connectors on the PC that they're plugged into. **–H. M.** ▶

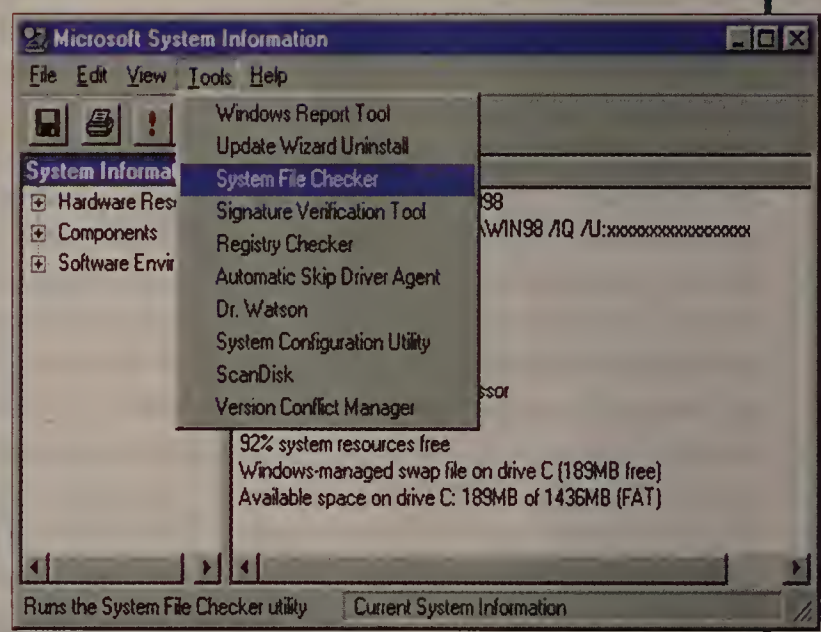
WINDOWS 98 SURVIVAL GUIDE

WINDOWS 98—It's just Windows 95 with new curtains, right? Well, mostly. But roll up the shades and you'll see that this year's model has several new features and tools to make it easier to track down errors and conflicts. And you're going to need those software bloodhounds: Since it shipped in June, Windows 98 has had more than its share of problems, especially in connection with hardware support (see September's *Bugs and Fixes* for an initial damage report). Here are our tips for avoiding trouble with the operating system:

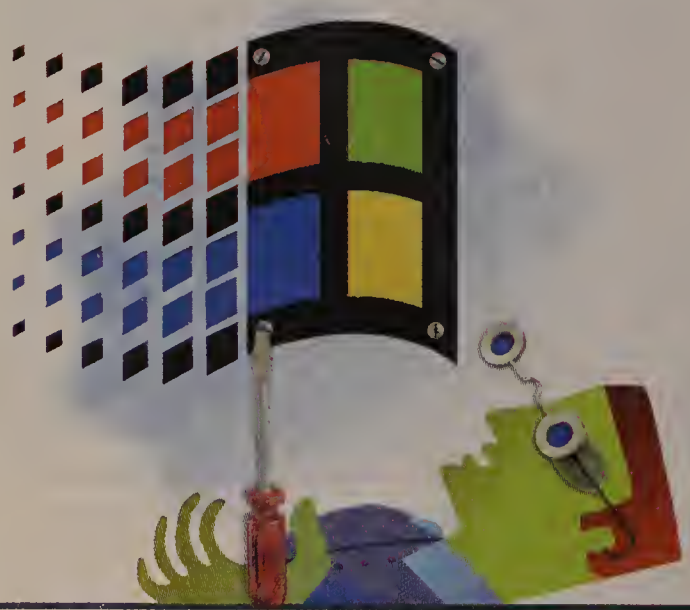
Don't skip the backup. Windows 98 tries to back up your existing Windows 95 files so you can undo your Windows 98 installation. For upgraders who are low on disk space (Windows 98 demands hundreds of megabytes), the setup program offers the opportunity to skip creating the backup files, which saves about 50MB of memory. Don't do it. Quit the installation, move files off your hard drive, and restart the installation. Windows 98 is a swell OS in many ways, but if you can't get it to recognize your tape drive or scanner, you'll want to switch back to Windows 95 easily. To uninstall Windows 98, choose *Start•Settings•Control Panel•Add/remove programs*, and then double-click *Uninstall Windows 98*.

Consult your manufacturer before upgrading. Though the exact reasons have yet to emerge from the mists of Redmond, Windows 98 clashes with a bunch of desktop and portable systems from major manufacturers like Dell, Compaq, and Gateway (see this month's *Top of the News* and *Bugs and Fixes* for the latest). Reports of peripherals that refuse to work under Windows 98 are trickling in, too. The problems are more irritating than lethal; still, you may want to defer the upgrade until the vendor releases a BIOS upgrade, updated driver, or software patch to solve the problem.

Update your drivers after upgrading. It just got here, but Windows 98 may or may not properly detect the hardware you've painstakingly installed under Windows 95. For example, no matter what I do, Windows 98 refuses to recognize my U.S. Robotics Sportster V.34 modem, even though Windows 95 OSR2 did. If Windows misdetects your hardware, look for and download an updated driver from the vendor's Web site, select *Start•Settings•Control Panel•System•Device Manager*, right-click the device you want to update, and then choose *Properties*. Click the *Driver* tab, then click *Update Driver* to start the Update Device Driver Wizard. Click *Next*, select the option to display a list of all drivers, and click *Next* again. Select *Show all hardware*, click *Have Disk*, and browse to your downloaded (and decompressed) drivers to complete the installation. And they said Windows 98 was going to be easier to install. **–Scott Spanbauer**



TROUBLESHOOT WINDOWS 98 using the improved System Information utility in the Start menu's SystemTools folder.



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Poor Man's Switch Box

The most elegant way to connect lots of serial or parallel devices to your PC is to install extra ports or hook up a switch box. But here's a dirt-cheap (less than $10) method that takes only 20 seconds or so to set up: Use a serial or parallel extender cable. You can plug one end into your PC and keep the other right at your fingertips on (or under) the desk; from then on, you can switch devices without rummaging around behind the computer.

In some instances, you may have to reboot your PC before you can successfully swap devices—for example, if you alternate between using a mouse and using a graphics tablet on a single serial port. To eliminate the possibility of a PC-damaging power spike, you should always shut off the PC before swapping devices. These limitations apply with equal force to most expensive (and space-hogging) switch box setups. Alternatively, for about $25, you can install an add-in card in your PC that will create a second parallel port. **–S. M. and H. M.**

Decode Parallel Port Settings

In light of the popularity and variety of parallel-port peripherals (Zip drives, scanners, and high-speed printers), you must take special care to configure the parallel port correctly in the PC's BIOS system setup program. Look for the parallel-port setting in the BIOS's Integrated Peripherals (or a similarly named) section. You'll probably find three options: SPP (Standard Parallel Port), the original (and slow) standard designed for old-style printers; EPP (Enhanced Parallel Port) for parallel-port devices and printers connected to a device's pass-through connector; and ECP (Enhanced Capabilities Port, also known as the IEEE-1284 port), which may perform better with high-end laser printers. EPP is probably your best choice, since ECP doesn't always work with parallel-port devices that have a pass-through connector. **–S. M.**

Good Mousekeeping

If accumulated gunk is making your mouse nearly unusable, give that plastic rodent a good cleaning. First, power off your computer and disconnect the mouse. Then remove the retaining ring and take out the ball. Use a toothpick to scrape the gummy residue off the rollers; and for good measure, finish the job with a foam-tipped swab moistened with a little window cleaner or rubbing alcohol. Blow any loose particles out of the inside of the pointing device with a can of compressed air. Wash the ball in slightly soapy water, and towel-dry. Be sure everything is dry and lint-free before putting it back together. **–J. A.**

Sound Steps for Better Audio

You don't need to invest in a $300 sound system to spiff up your PC's audio. Start by positioning your speakers roughly 15 to 24 inches apart; that distance creates the strongest stereo effect with most models. Then set both the sound card's volume and the speaker volume to the middle of the range.

If your home PC is in the same room as a stereo system with good speakers, you might want to dispense with computer speakers altogether and pump your PC's audio into the stereo setup. The cable you are most likely to need has a one-eighth-inch stereo miniplug at one end and dual RCA plugs at the other. Such cables are available at RadioShack and other audio dealers for a few dollars. **–H. M.**

High-Speed Connections

Upgrade Your Modem to V.90

Still connecting at 33.6 kbps? If your modems sports either Rockwell's K56flex or 3Com/U.S. Robotics' x2 chip set, upgrading to the V.90 standard may allow you to connect to services that don't support either x2 or K56flex at a higher rate. Visit the company's Web site and follow the directions posted there for downloading a firmware upgrade. In most cases, installing the upgrade involves closing all applications and then running a patch program that transfers the new firmware to the modem. Afterward, update the modem's drivers to take advantage of the firmware's new features. **–J. A.**

Surf in the Fast Lane

How fast can you go on the Web? Unless all the pieces of your system are tuned for optimal performance, you'll be stuck in the slow lane. For general serial port and modem help, Hank Volpe's $25 Modem Doctor or Kiss Software's $30 ModemWizard will identify your hardware and help you significantly (both are available from PC World Online). To find out how fast you're going on the Internet, use Net.Medic from Vital-Signs Software. But beware: The trial version can't tell whether you are using a network connection, and it only seems to be able to judge Internet speeds when Dial-Up Networking is active. **–J. A.**

- **Modem Doctor** $25; Hank Volpe; 410/256-5767; www.modemdoctor.com

INFONET NO. 729

- **Modem Wizard** $30; Kiss Software; 888/768-5477; www.kissco.com

INFONET NO. 730

- **Net.Medic** $50; Vital Signs Software; 888/980-8844; www.vitalsigns.com

INFONET NO. 731

How Great UART?

External modems are convenient to install and use, but the Universal Asynchronous Receiver/Transmitter chips on older PCs' serial ports may be too slow for 14.4-kbps and faster modems. ▶

PHOTO: STAN MUSILEK

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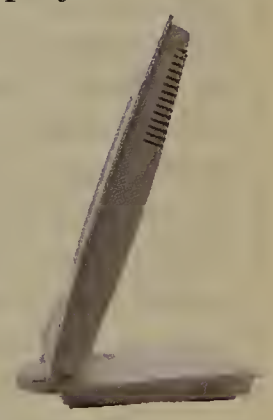
– John C. Dvorak, PC Magazine, Sept. 1, 1998

The DPP 500 PowerPanel delivers a **bright, sharp, digital image** that no analog display can match. From the smallest text to the fastest graphic animation, the DPP 500 offers **new levels of realism and detail**. The PowerPanel's active matrix TFT XGA display completely eliminates screen flicker, focus and convergence problems, while ensuring **100% edge-to-edge image sharpness**. And the DPP 500 also includes an ATI Graphics card that, combined with Windows® 98, allows you to **view images on two monitors** simultaneously.** The DPP 500 also features a built-in microphone and stereo speakers.*** The DPP 500 PowerPanel. **Pure Digital. Pure Power.** Only from Princeton, the display technology leader for over 20 years.



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(If your modem is an internal model, don't worry—it contains its own UART chip, which will be speedy enough.) Slow UARTs include the 8250 and 16450 models. The 16550A, AN, and AFN chips are all fast enough for analog modems (up to 56K). To see which chip you have, select *Start•Settings•Control Panel•Modems*, click the *Diagnostics* tab, choose the COM port you want to query, and then click the *More Info* button. If the older UARTs on your motherboard are the socketed type, you can replace them with a 16550. JDR Microdevices sells these chips for $7. **–J. A.**

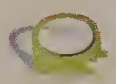
• **1650 UART chip** $7; JDR Microdevices; 800/538-5000; www.jdr.com

INFONET NO. 732

ISDN Wants High-Speed Ports

The 16550 UART is fast enough to handle an external analog modem, but ISDN is another story. ISDN moves data from a remote site to your ISDN modem at a maximum speed of 128 kbps; but thanks to compression, the modem may try to funnel the bits into your serial port at four times that speed. Your 16550 UART, which tops out at 115 kbps, just ain't fast enough. New 16650 and 16750 UARTs are much speedier but generally aren't preinstalled on computers (to find out which chip you have, see "How Great UART?"). To get the best performance from your external ISDN adapter, you must install a new I/O adapter that uses the faster UARTs. Lava Computers (www.lavalink.com), Pacific CommWare (www.pacificcommware.com), and Boca Research (www.bocaresearch.com) sell high-speed serial-port cards in the $50-to-$80 range. **–S. M.**

Get Port Settings Right



Though the default port settings usually work fine, you may want to double-check Windows' settings to make sure you're getting the most out of your modem. First, choose a serial port speed that's fast enough to handle the flow of compressed data streaming from your modem into your PC (whether the modem is internal or external). To set the port speed, choose *Start•Settings•Control Panel•Modems*, select the modem you want to configure, and click the *Properties* button and then the *General* tab. Choose the speed setting from the drop-down Maximum Speed list. For 28.8- and 33.6-kbps modems, choose 57600; for 56-kbps modems, 115200; and for ISDN modems, 115200 or higher (high-speed serial port adapters should offer 230400 or 460800 settings). While you have the modem settings applet open, click the *Connection* tab and then the *Advanced* button, and make sure that 'Use flow control' and 'Hardware (CTS/RTS)' are selected. **–J. A.**

Talk Back to Your Modem

Just about every modem in the universe touts itself as being Hayes compatible, meaning that it understands most of the AT command language devised by the Hayes company back in the 1970s (see "Modem Talk," below). You don't need to know AT commands to use a modem, but sometimes the right instruction can get a stuck modem flying again. Bear in mind that not all commands work with all modems, and that modem manufacturers supplement the basic Hayes language with their own proprietary (and useful) modem-specific AT commands. To learn what these are, consult the modem's manual or the vendor's Web site.

To use AT commands, open Windows' HyperTerminal applet by selecting *Start•Programs•Accessories* and then double-clicking the Hypertrm.exe icon (In OSR2 and Windows 98, look in the Communications folder under Accessories). **–H. M.**

Find files from this article at PC World Online's FileWorld (www.fileworld.com). Jim Aspinwall writes Computer Currents' *"Windows Advisor" column, and has authored or co-authored several books that focus on configuring and troubleshooting PC hardware. Harry McCracken is a senior writer and Stan Miastkowski and Scott Spanbauer are contributing editors for* PC World. ■

MODEM TALK

Modem stuck in park? Put it gear with an AT command (see "Talk Back To Your Modem," above).

COMMAND	FUNCTION
AT DT *xxx-xxxx*	Dials the number *xxx-xxxx*.
AT H	Disconnects current call.
AT A	Answers incoming call.
AT E1	Turns on echoing (use it if your communications program doesn't display commands as you type them).
AT Z	Resets modem (essential for internal modems, since you can't just flip the power switch).
AT I7	Displays modem's manufacturer, model, and version number.
AT L0	Set lowest speaker volume.
AT &F *(or* AT &F1*)*	Restores modem to its default factory settings.
A/ *(without AT prefix)*	Repeats last command issued.
+++ *(without AT prefix)*	Switches modem into command mode while you're connected.
AT O0	Lets you return online from command mode.

Quantex customers are happier than IBM, Gateway, or Micron customers.[1]

Are you?

[1]Results based on a Windows Magazine (Aug. '97) 'Technical Support Survey' in which Quantex received a 91% 'Buy Again Rating,' higher than that received by IBM, Micron and Gateway and on PC Magazine (July '98) 'Service and Reliability Survey' in which Quantex received the highest ratings for its customers' 'Tech Support Experience' in 4 out of 5 categories including 'tech was knowledgeable, tech tried everything to help, prompt resolution and got a run-around.' Calculations based on 25 vendors evaluated in the survey

It's about time you

Quantex Notebooks feature the Intel® Pentium® processor with MMX™ technology and the Pentium® II processor

Today, Quantex is one of the world's largest direct marketers of computer systems, featuring the Intel® Pentium® II processor. And in the last year, Quantex has consistently placed at or near the top in surveys of customer satisfaction and tech support. As well as winning dozens of product rating awards in the most respected publications.

As more businesses and experts say good things about Quantex, you're bound to wonder, "How good can they be?" There's one way to find out.

DELL NUDGES OUT QUANTEX BY 1% FOR CUSTOMER SATISFACTION. QUANTEX CUSTOMERS VERY HAPPY. MANAGEMENT NOT[1].

OK. We may not be number one in total customer satisfaction yet, but we're real close. And we can do better. That's why so many people who have bought Quantex say they'll buy Quantex again. And do. And they tell others. How else could we get this big when most people still don't even know our name?

WOULD YOU BUY AGAIN?

Vendor	% who would buy the same brand
Dell	92%
Quantex	**91%**
IBM	89%
Micran	81%
Gateway	80%
Acer	74%
Digital	69%
Tashiba	61%
Compaq	58%
Packard Bell	51%

Windows Magazine, 8/97

QUANTEX RATED NUMBER ONE IN TECH SUPPORT. #2-#25 NEED TO TRY HARDER[2].

In the most recent *PC Magazine* study, PC owners rated Quantex the leader for tech support based on their own experiences. For the technical knowledge of our people and the promptness of the resolution, no one beat Quantex. And no one came within 10 points

COMPUTER SHOPPER 1997 Direct Channel Achievement Award

PC COMPUTING 1997 Mast Valuable Praduct Award

PC WORLD Best Buy Award (1/98)

PC WORLD Best Buy Award (2/98)

PC WORLD Best Buy Award (3/98)

PC WORLD Best Buy Award Award (4/98)

PC WORLD Best Buy Award Award (5/98)

PC WORLD #1 Best Buy Award (6/98)

[1]Results based on a Windows Magazine (Aug. '97) 'Technical Support Survey' in which Quantex received a 91% 'Buy Again Rating,' higher than that received by IBM, Micron and Gateway.

experienced Quantex.

Quantex Business Desktops feature the Intel® Pentium® II processor

for "tech tried everything to help." Not Dell. Not Gateway. Not Micron. Not IBM. Not Compaq.

Hey, we may not be a household name yet. So we go the extra mile. And our customers notice it.

TECH SUPPORT EXPERIENCE

Vendor	Tech was knowledgeable	Tech tried everything to help	Prompt resolution	Got a run-around
Quantex	**57%**	**59%**	**49%**	**9%**
Micron	56%	47%	43%	9%
Gateway	54%	48%	45%	10%
Dell	54%	43%	49%	10%
IBM	41%	33%	36%	15%
Campaq	37%	30%	30%	17%
Average*	**40%**	**33%**	**32%**	**16%**

"Service and Reliability Survey," PC Magazine, July 1998
* calculations based on all 25 PC vendors evaluated in the survey.

QUANTEX SYSTEMS KEEP WINNING. COMPETITION AT A LOSS.

Obviously, it takes a lot more than great support to generate great customer satisfaction. And more than VERY competitive prices. It takes great computers featuring the Intel Pentium® II processor. And Quantex configures them with industry-standard "enhancements" that make Quantex systems regular winners in the "best buy" category.

CALL TODAY AND ORDER

QUANTEX

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www.quantex.com/pcworld

PC WORLD	PC WORLD	PC WORLD	WINDOWS MAGAZINE	C|NET ONLINE	PC PORTABLES	PC COMPUTING	PC COMPUTING
#1 Best Buy Award (7/98)	#1 Best Buy Award (8/98)	Best Buy Award (9/98)	WINLIST Award (7/98)	Editors' Choice Award (6/98)	Best Buy Award (3/98)	4-stor "Torture Test" Survivor (4/98)	4-star Roting (9/98)

Results based on PC Magazine (July '98) 'Service and Reliability Survey' in which Quantex received the highest ratings for its customers' 'Tech Support Experience' in 4 out of 5 categories including 'tech was knowledgeable, tech tried everything to help, prompt resolution and got a run-around.' Calculations based on 25 vendors evaluated in the survey.

Systems with better

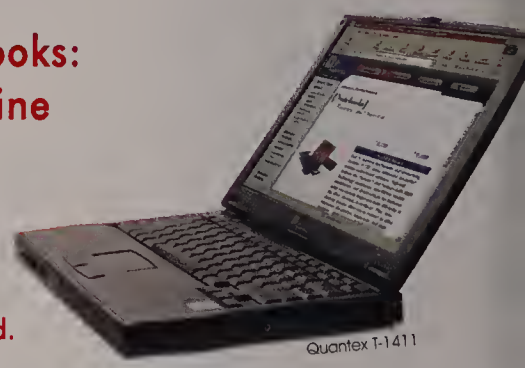
BETTER MANAGEABILITY MEANS BETTER PRODUCTIVITY FOR YOUR BUSINESS.

Quantex Business Desktops bring enterprise management technology, traditionally implemented by large corporations, to businesses of all sizes–including yours. Built according to industry-standard initiatives such as Wired for Management, DMI 2.0, PC '98, LDCM and ACPI, these desktops are designed to lower your total cost of ownership. They also incorporate capabilities for improved asset management, remote wake-up of systems over the LAN and remote configurations and diagnostics. Plus, our innovative QSentry technology assures unsurpassed confidence and security by constantly monitoring the health of Quantex PCs. If you want to do something more productive, install Quantex Business Desktops. **Starting at just $1049**

LCD FLAT PANEL DISPLAY

Looking to provide your business with a better view? Quantex gives it to you right between the eyes with this state-of-art 15" LCD monitor with on-screen controls. Engineered with the category's most advanced technologies, this active matrix TFT flat panel produces clear, crisp pictures with bright vivid colors. And a 15.0" viewable area that outperforms many large screen monitors. Including landscape and portrait modes. All this while saving approximately 75% of the desk space and up to 70% of the power used by traditional CRT's.

Quantex Notebooks: How do you define performance?



Quantex T-1411

THE "H" SERIES:
Much more than you thought you could afford.

Having taken three consecutive PC World #1 Best Buy Awards (06/98-08/98), the Quantex Notebook is a proven price/performance winner—including core mobile technologies for one great price. For the perfect combination of features and functionality for any type of business environment, you've got to check it out. **Starting at just $1999**

THE "T" SERIES:
Think bigger. Carry smaller.

Get the full force of today's state-of-the-art mobile technology in a lean, 1.45 inch thick, 6.4 pound notebook. Look at the Quantex T-1411 and start packing more by carrying less. **Starting at just $2999**

THE "I" SERIES:
It just doesn't get any better.

For extreme mobile computing power and performance, the Quantex I-1411 is as good as it gets. Boasting a big 14.1," 1024x768 display, fast mobile Pentium® II processor 300MHz, AGP graphics technology and advanced communications it doesn't just replace your desktop. It humbles it. **Starting at just $3199**

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performance built in.

BUSINESS NOTEBOOKS

OPTIONS: Mini-Docking Station $149 ▪ 2nd Lithium Ion Battery $129 ▪ PCMCIA NIC $129 ▪ Deluxe Carrying case $99

Quantex H-1330 $2199

Business lease: $77/Mo.

- Pentium® II processor 266MHz
- Intel Mobile Module (I.M.M.) Architecture
- 13.3" XGA Active Matrix Display
- 32MB SDRAM
- 512KB Secondary Cache
- 4GB Ultra ATA HD / 3.5" 1.44MB Modular Floppy Drive
- PCMCIA K56flex protocol Fax/Modem*
- 24X Modular CD-ROM Drive
- PCI Bus with 128-bit graphics accelerator
- Integrated 16-bit Stereo Sound and Speakers
- Smart Lithium Ion Battery
- USB and Fast IR Ports
- Integrated Personal Touchpad
- MS Windows 98
- Corel Office Suite 8
- Carrying Case
- 3-year limited warranty on CPU and Main Memory
- 1-year parts and labor limited warranty on all other components

H-1330 w/Pentium II processor 233MHz.....$1999

Quantex H-1331 $2499

Business lease: $88/Mo.

- Pentium® II processor 266MHz
- Intel Mobile Module (I.M.M.) Architecture
- 13.3" XGA Active Matrix Display
- 64MB SDRAM
- 512KB Secondary Cache
- 4GB Ultra ATA HD / 3.5" 1.44MB Modular Floppy Drive
- PCMCIA K56flex protocol Fax/Modem*
- 24X Modular CD-ROM Drive
- PCI Bus with 128-bit graphics accelerator
- Integrated 16-bit Stereo Sound and Speakers
- Smart Lithium Ion Battery
- 2nd Lithium Ion Battery
- Mini-Docking Station
- USB and Fast IR Ports
- Integrated Personal Touchpad
- MS Windows 98
- Microsoft Office '97 SBE Ver 2
- Carrying Case
- 3-year limited warranty on CPU and Main Memory

H-1331w/Pentium II processor 300MHz.....$2749

Quantex T-1411 $3199

Business lease: $104/Mo.

- Pentium® II processor 300MHz
- Intel Mobile Module (I.M.M.) Architecture
- 14.1" XGA Active Matrix Display
- 96MB SDRAM
- 512KB Secondary Cache
- 6GB Ultra ATA HD / 3.5" 1.44MB Modular Floppy Drive
- 56K V.90 Fax/Modem*
- 2X DVD-ROM Drive
- PCI Bus with 128-bit graphics accelerator
- Integrated 16-bit Stereo Sound and Speakers
- Smart Lithium Ion Battery
- 2nd Lithium Ion Battery
- Mini-Docking Station
- USB and Fast IR Ports
- Integrated Personal Touchpad
- MS Windows 98
- Microsoft Office '97 SBE Ver 2
- Carrying Case
- 3-year limited warranty on CPU and Main Memory
- 1-year parts and labor limited warranty on all other components

T-1411 w/Pentium II processor 266MHz.....$2999

Quantex I-1411 $3399

Business lease: $111/Mo.

- Pentium® II Processor 300MHz
- Intel Mobile Module (I.M.M.) Architecture
- 14.1" XGA Active Matrix Display
- 128MB SDRAM
- 512KB Secondary Cache
- 6GB Ultra ATA HD / 3.5" 1.44MB Modular Floppy Drive
- 56K V.90 Fax/Modem*
- 2X DVD-ROM Drive
- ATI 3D AGP Graphics Accelerator w/8MB
- Integrated 16-bit Stereo Sound and Speakers
- Smart Lithium Ion Battery
- 2nd Lithium Ion Battery
- Mini-Docking Station
- USB and Fast IR Ports
- Integrated Personal Touchpad
- MS Windows 98
- Microsoft Office '97 SBE Ver 2
- Carrying Case
- 3-year limited warranty on CPU and Main Memory
- *Upgrade to 8GB Ultra ATA Hard Drive for $149*

I-1411 w/Pentium II processor 266MHz.....$3199

BUSINESS DESKTOPS

MS OFFICE '97 SBE VER 2 : Word 97 ▪ Excel 97 ▪ Publisher 98 ▪ Outlook 98 ▪ Direct Mail Manager ▪ Small Business Financial Manager 98 ▪ Expedia Streets 98 ▪ IE 4.0

QP6/300 SB-1 $1099

Business lease: $39/Mo.

- Pentium® II Processor 300MHz
- 2 Universal Serial Bus (USB) Ports / DMI 2.0
- 32MB SDRAM Memory / 512KB Secondary Cache
- 4.3GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 64-bit 3D PCI Graphics Card with 4MB RDRAM
- 15" Digital Monitor (13.8" viewable)
- Intel Pro 10/100 PCI Ethernet Controller w/RJ-45 and Wake-On-LAN Technology
- 32X Max EIDE CD-ROM Drive
- Quantex ATX Mid Tower Case
- MS Natural Keyboard Elite with MS Mouse
- MS Windows 98
- 3-year limited warranty with 1-year On-Site Service*
- 24-hr./7-day Technical Support
- QSentry Technology (Including Intel LANDesk Client Manager V.3.1)
- *Upgrade to Windows NT Workstation 4.0 for $99*

QP6/266 SB-1(w/ Pentium® II Processor).....$1049

QP6/350 SB-2 $1499

Business lease: $53/Mo.

- Pentium® II Processor 350MHz
- 2 Universal Serial Bus (USB) Ports / DMI 2.0
- 64MB PC100 SDRAM Memory / 512KB Secondary Cache
- 6.4GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- Intel740™ 3D AGP Graphics with 8MB SDRAM
- 17" Digital Monitor w/ DSD (15.8" viewable)
  Upgrade to 17" Monitor w/NEC CromaClear CRT for $79
- Intel Pro 10/100 PCI Ethernet Controller w/RJ-45 and Wake-On-LAN Technology
- 32X Max EIDE CD-ROM Drive
- Quantex ATX Mid Tower Case
- MS Natural Keyboard Elite with MS IntelliMouse
- MS Windows 98
- Microsoft Office '97 SBE Ver 2
- 3-year limited warranty with 1-year On-Site Service**
- 24-hr./7-day Technical Support
- QSentry Technology (Including Intel LANDesk Client Manager V.3.1)
- *Upgrade to Windows NT Workstation 4.0 for $99*
- *Add 56K V.90 Fax/Modem* for $39*

QP6/333 SB-2(w/ Pentium® II Processor).....$1399

QP6/400 SB-3 $1849

Business lease: $65/Mo.

- Pentium® II Processor 400MHz
- 2 Universal Serial Bus (USB) Ports / DMI 2.0
- 64MB PC100 SDRAM Memory / 512KB Secondary Cache
- 8.4GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- Intel740™ 3D AGP Graphics with 8MB SDRAM
- 17" Digital Monitor w/DSD & NEC CromaClear CRT (16.0" viewable; .25 dp; 1600x1200 max. resolution)
- Intel Pro 10/100 PCI Ethernet Controller w/RJ-45 and Wake-On-LAN Technology
- 32X Max EIDE CD-ROM Drive
- Quantex ATX Mid Tower Case
- MS Natural Keyboard Elite with MS IntelliMouse
- MS Windows NT 4.0 Workstation
- Microsoft Office '97 SBE Ver 2
  Upgrade to MS Office '97 Professional for $199
- 3-year limited warranty with 1-year On-Site Service**
- 24-hr./7-day Technical Support
- DSentry Technology (Including Intel LANDesk Client Manager V.3.1)
- *Add 56K V.90 Fax/Modem* for $39*
- *Upgrade to 15.0" LCD Flat-Panel Display for $549*

QP6/350 SB-3(w/ Pentium® II Processor).....$1649

QP6/450 SB-4 $2299

Business lease: $81/Mo.

- Pentium® II Processor 450MHz
- 2 Universal Serial Bus (USB) Ports / DMI 2.0
- 64MB PC100 SDRAM Memory / 512KB Secondary Cache
- 10.2GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- #9 Revolution IV 128-bit 3D AGP Graphics with 32MB
- 19" Monitor w/ OSD (18.1" viewable), 1600x1200, .26dp
- Intel Pro 10/100 PCI Ethernet Controller w/RJ-45 and Wake-On-LAN Technology
- 32X Max EIDE CD-ROM Drive
- Quantex ATX Mid Tower Case
- MS Natural Keyboard Elite with MS IntelliMouse
- MS Windows NT 4.0 Workstation
- Microsoft Office '97 SBE Ver 2
  Upgrade to MS Office '97 Professional for $199
- 3-year limited warranty with 1-year On-Site Service**
- 24-hr./7-day Technical Support
- QSentry Technology (Including Intel LANDesk Client Manager V.3.1)
- *Add 56K V.90 Fax/Modem* for $39*
- *Upgrade to 15.0" LCD Flat-Panel Display for $399*

QP6/400 SB-4(w/ Pentium® II Processor)..... $2099

BUSINESS SERVERS

QX5000 Server $2499

Business lease: $88/Mo.

- Pentium® II Processor 450MHz (Dual-Processor Upgradable)
- 64MB 100MHz ECC SDRAM (1GB Max.) / 512KB L2 ECC Cache
- 32X Max EIDE CD-ROM Drive/3.5" 1.44MB Floppy Drive
- 4GB Ultra-Wide SCSI-3 Hot-Swappable Hard Drive
- Dual Channel Ultra-Wide & Narrow SCSI-3 Controller
- Intel EtherExpress Pro™ 100B Fast Ethernet w/RJ-45
- Server Tower Case w/ 5 Hot-Swap Bays
- I$_2$O -Ready & RAID capable
- Emergency Management Port
- 3-year limited warranty with 1-year On-Site Service**
- Intel LANDesk Server Manager V2.8

QX5000 Server $3799

Business lease: $124/Mo.

- Pentium® II Processor 450MHz (Dual-Processor Upgradable)
- 128MB 100MHz ECC SDRAM Memory
- 9.1GB Ultra-Wide SCSI-3 Hot-Swappable Hard Drive
- MS Windows NT Server 4.0 w/10 Client License

QX4000 Small Business Server $3999

Business lease: $130/Mo.

- Pentium® II Processor 400MHz (Dual-Processor Upgradable)
- 512KB L2 ECC Cache
- 128MB 100MHz ECC SDRAM Memory (1GB Max.)
- 3.5" 1.44MB Floppy Drive
- 4GB Ultra-Wide SCSI-3 Hard Drive (7200 rpm)
- 15" Digital Monitor (13.8" viewable)
- Dual Channel Ultra-Wide & Narrow SCSI-3 Controller
- 32X Max EIDE CD-ROM Drive
- K56flex protocol Fax/Modem*
- Intel EtherExpress Pro™ 100B Fast Ethernet w/RJ-45
- Mid Tower Server Case
- 104-Key Keyboard with MS Mouse
- Microsoft® BackOffice® Small Business Server Suite
- 3-year limited warranty with 1-year On-Site Service**
- 24-hr./7-day Technical Support
- Intel LANDesk Server Manager V2.8
- *Call for Special Server Support Options*
- *Call for additional processor configurations*

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VALUE MULTIMEDIA

SOFTWARE: Corel Office Suite 8 • MS Money '97 • Compton's Interactive Encyclopedia • Body Works 6.0 • Amazon Trail II American Heritage Talking Dictionary • Internet the City • Compton's Reference Collection • Dr. Solomons Find-Virus • MS Internet Explorer 4.0

QP6/300M-1x $1199

Business lease: $42/Mo.

- Pentium® II Processor 300MHz
- 64MB SDRAM Memory / 512KB Secondary Cache
- 4.3GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 64-Bit 3D PCI Graphics Accelerator with 4MB
- 15" Digital Monitor (13.8" viewable)
- 56K V.90 PCI Fax/Modem* w/Voice Mail and Speakerphone
- 32X Max EIDE CD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-90 Speakers
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS Mouse
- MS Windows 98
- Value Multimedia Software Bundle
- 3-year limited warranty with 1-year On-Site Service**

QP6/350 M-1x(with Pentium II processor).....$1349

QP6/333M-2x $1499

Business lease: $53/Mo.

- Pentium® II Processor 333MHz
- 64MB SDRAM Memory / 512KB Secondary Cache
- 8.4GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- Toshiba MPACT2 3D Media Accelerator w/8MB RDRAM
- 17" Digital Monitor w/OSD (15.8" viewable)
- 56K V.90 PCI Fax/Modem* w/Voice Mail and Speakerphone
- 3rd-Generation DVD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-90 Speakers
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS Mouse
- MS Windows 98
- Value Multimedia Software Bundle
- 3-year limited warranty with 1-year On-Site Service**

QP6/350 M-2x(with Pentium II processor).....$1599

QP6/350 M-3x $1699

Business lease: $60/Mo.

- Pentium® II Processor 350MHz
- 64MB PC100 SDRAM Memory / 512KB Secondary Cache
- 10.2GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- Toshiba MPACT2 3D Media Accelerator w/8MB RDRAM
- 17" Digital Monitor w/OSD (15.8" viewable)
  Upgrade to 17" Monitor w/NEC CromaClear CRT for $79
- Internal 100MB Zip Drive with one cartridge
- 56K V.90 PCI Fax/Modem* w/Voice Mail and Speakerphone
- 3rd-Generation DVD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-90 Speakers
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS Mouse
- MS Windows 98
- Value Multimedia Software Bundle

QP6/400 M-3x(with Pentium II processor).....$1899

QP6/400 M-4x $1999

Business lease: $70/Mo.

- Pentium® II Processor 400MHz
- 64MB PC100 SDRAM Memory
- 512KB Secondary Cache
- 10.2GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- Intel740™ 3D AGP Graphics with 8MB SDRAM
- 19" Monitor w/OSD (18.1" viewable), 1600x1200, .26dp
- 56K V.90 PCI Fax/Modem* w/Voice Mail and Speakerphone
- 3rd-Generation DVD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-90 Speakers
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS Mouse
- MS Windows 98
- Value Multimedia Software Bundle
- *Add Altec Lansing ACS-251 Subwoofer for $39*
- *Upgrade to 15.0" LCD Flat-Panel Display for $399*

QP6/450 M-4X(with Pentium II processor).....$2199

POWER MULTIMEDIA

SOFTWARE: MS Office '97 Small Business Edition Ver 2 • MS Money '97 • Office Mate • Day Planner Pro • Power Business Plans • Form Designer Pro • Project Manager Pro • Labels Unlimited • Compton's Reference Collection • Dr. Solomons Find-Virus • MS Internet Explorer 4.0

QP6/400 SM-1x $1799

Business lease: $63/Mo.

- Pentium® II Processor 400MHz
- 64MB PC100 SDRAM Memory / 512KB Secondary Cache
- 10.2GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- Intel740™ 3D AGP Graphics with 8MB SDRAM
- 17" Digital Monitor w/OSD (15.8" viewable)
- 56K V.90 PCI Fax/Modem* w/Voice Mail and Speakerphone
- 32X Max EIDE CD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-45.1 Speakers with subwoofer
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS IntelliMouse
- MS Windows 98
- Power Multimedia Software Bundle
- Microsoft Office '97 SBE Ver 2
- 3-year limited warranty with 1-year On-Site Service**

QP6/350 SM-1x(with Pentium II processor).....$1599

QP6/400 SM-2x $1999

Business lease: $70/Mo.

- Pentium® II Processor 400MHz
- 64MB PC100 SDRAM Memory / 512KB Secondary Cache
- 12.9GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- Intel740™ 3D AGP Graphics with 8MB SDRAM
- 17" Digital Monitor w/ OSD & NEC CromaClear CRT (16.0" viewable; .25 dp; 1600x1200 max. resolution)
- 56K V.90 PCI Fax/Modem* w/Voice Mail and Speakerphone
- 3rd-Generation DVD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-45.1 Speakers with subwoofer
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS IntelliMouse
- MS Windows 98
- Power Multimedia Software Bundle
- Microsoft Office '97 SBE Ver 2
- *Upgrade to 15.0" LCD Flat-Panel Display for $549*

QP6/450 SM-2x(with Pentium II processor).....$2199

QP6/450 SM-3x $2399

Business lease: $84/Mo.

- Pentium® II Processor 450MHz
- 128MB PC100 SDRAM Memory / 512KB Secondary Cache
- 12.9GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- #9 Revolution IV 128-bit 3D AGP Graphics with 32MB
- 17" Digital Monitor w/ OSD & NEC CromaClear CRT (16.0" viewable; .25 dp; 1600x1200 max. resolution)
- Internal 100MB Zip Drive with one cartridge
- 56K V.90 PCI Fax/Modem* w/Voice Mail and Speakerphone
- 32X Max EIDE CD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-45.1 Speakers with subwoofer
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS IntelliMouse
- MS Windows 98
- Power Multimedia Software Bundle
- Microsoft Office '97 SBE Ver 2
- *Upgrade to 15.0" LCD Flat-Panel Display for $549*

QP6/400 SM-3x(with Pentium II processor).....$2199

QP6/450 SM-4x $2699

Business lease: $95/Mo.

- Pentium® II Processor 450MHz
- 128MB PC100 SDRAM Memory / 512KB Secondary Cache
- 16.8GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- Intel740™ 3D AGP Graphics with 8MB SDRAM
- 19" Monitor w/OSD (18.1" viewable), 1600x1200, .26dp
- Internal 100MB Zip Drive with one cartridge
- 56K V.90 PCI Fax/Modem* w/Voice Mail and Speakerphone
- 3rd-Generation DVD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-490 Dolby Surround Sound Speakers with subwoofer
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS IntelliMouse
- MS Windows 98
- Power Multimedia Software Bundle
- Microsoft Office '97 SBE Ver 2
- *Upgrade to 15.0" LCD Flat-Panel Display for $399*

QP6/400 SM-4x(with Pentium II processor).....$2499

SUPER MULTIMEDIA

QP6/400 M-4x SE $2199

Business lease: $77/Mo.

- Pentium® II Processor 400MHz
- 128MB PC100 SDRAM Memory / 512KB Secondary Cache
- 12.9GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- Intel740™ 3D AGP Graphics with 8MB SDRAM
- 19" Monitor w/OSD (18.1" viewable), 1600x1200, .26dp
- Internal 100MB Zip Drive with one cartridge
- 56K V.90 PCI Fax/Modem* w/Voice Mail and Speakerphone
- 3rd-Generation DVD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-90 Speakers
- Quantex ATX Mid Tower Case
- MS Natural Keyboard Elite with MS Mouse
- MS Windows 98
- Value Multimedia Software Bundle
- 3-year limited warranty with 1-year On-Site Service**
- *Add Altec Lansing ACS-251 Subwoofer for $39*
- *Upgrade to 15.0" LCD Flat-Panel Display for $399*

QP6/450 M-4x SE(with Pentium II processor).....$2399

QP6/450 SM-4x SE $2999

Business lease: $105/Mo.

- Pentium® II Processor 450MHz
- 128MB PC100 SDRAM Memory / 512KB Secondary Cache
- 16.8GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- #9 Revolution IV 128-bit 3D AGP Graphics with 32MB
- 21" Monitor w/OSD (20.0" viewable), 1600x1200, .26dp
- 56K V.90 PCI Fax/Modem* w/Voice Mail and Speakerphone
- 32X Max EIDE CD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-490 Dolby Surround Sound Speakers & subwoofer
- Quantex ATX Mid Tower Case
- MS Natural Keyboard Elite with MS Mouse
- MS Windows 98
- Power Multimedia Software Bundle
- Microsoft Office '97 SBE Ver 2
- 3-year limited warranty with 1-year On-Site Service**

QP6/400 SM-4x SE(with Pentium II processor).....$2799

ULTIMATE GAMING PCS

QP6/400 GX-1 $1999

Business lease: $70/Mo.

- Pentium® II Processor 400MHz
- 64MB PC100 SDRAM Memory / 512KB Secondary Cache
- 10.2GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- Intel740™ 3D AGP Graphics with 8MB SDRAM
- 17" Digital Monitor w/OSD (15.8" viewable)
- 56K V.90 PCI Fax/Modem* w/Voice Mail and Speakerphone
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- 3Dfx Voodoo2 based 3D Game Accelerator w/12MB
- MS SideWinder 3D Pro Joystick
- Altec-Lansing ACS-45.1 Speakers w/Subwoofer
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BY SUSAN SILVIUS

17" Monitors

BIG SCREEN, LESS GREEN

The new desktop standard is the 17-inch monitor. It's sharper, streamlined, and about $500.

YOU WOULDN'T VIEW the Grand Canyon through a keyhole, so why would you squint at a mammoth spreadsheet or a mile-long report on a 14- or 15-inch monitor? Today, 17-inch monitors are the desktop standard, and for good reason. They offer the ideal balance of screen size, physical size, and price. The average street price for a ▶

PHOTOGRAPHS BY ROBERT CARDIN

IBM P72

Mitsubishi Diamond Pro 87TXM

BEST BUYS

WHEN IT COMES to monitors, image is everything. The **IBM P72** dons our Best Buy crown with its winning combination of excellent text and graphics, advanced controls (below left), and eye-catching design. The **Mitsubishi Diamond Pro 87TXM,** a perennial contender that's been hanging around the top of our chart since last year, claims second place with all-around great picture quality. Its sophisticated controls (below right) are easily accessible on a panel that glides elegantly from the monitor's bezel.

17-inch display has fallen below $500—nearly a third less than the $740 average of a year ago. That's still double what a typical 15-inch monitor costs, but trading up makes your documents a whopping 30 percent bigger. By increasing the resolution from 800 by 600 to 1024 by 768 (the highest recommended resolution for 17-inchers), you can fit 64 percent more content onto your screen—all of which translates into less scrolling and squinting, less mousing around.

But how can you tell which 17-inch monitor is best? To help you make the right choice, we evaluated two dozen different models, assessing them in terms of image quality, price, support policies, controls, and other features.

After all was said and done, two monitors marched away with Best Buys: the IBM P72 and the Mitsubishi Diamond Pro 87TXM. At $589, the P72 is relatively expensive, but our jury awarded it top honors for its razor-sharp text and vibrant graphics; it was the only monitor in the roundup deemed excellent in both categories (see *Top 10 Monitors,* page 245). The P72's elegant on-screen controls are easy to navigate and master, allowing precise—and lockable—fine-tuning.

Mitsubishi's Diamond Pro 87TXM garnered our other Best Buy—again. It's been a top contender since debuting on our March 1997 Top 10 chart. The 87TXM didn't match the P72 in displaying fine details, but it earned scores of very good for both text and graphics, and it costs $50 less. It has more extensive controls than the P72 and, for users sensitive to screen flicker, a higher refresh rate.

After analyzing the results of our jury tests, we discovered that tube type is a significant variable. In our image tests, displays with Sony Trinitron or Mitsubishi Diamondtron tubes (which use vertical red, green, and blue phosphor stripes) overwhelmingly outperformed those with shadow mask tubes (aka dot mask—which use trios of dots), accounting for seven of the Top 10, including both Best Buys.

If a low price is a high priority, take a look at the AcerView 79g. At $449, it costs the same as Samsung's SyncMaster 700p Plus and Apple's MultipleScan 720, but it earned higher marks for its excellent graphics. The trade-off is in the controls. You get the basics, but some higher-level settings, like on-screen display position and RGB control, are missing.

> Seventeen-inch monitors have **fallen below $500**—about a third less than last year's average price.

The Mitsubishi DiamondScan 70M is the only multimedia monitor of the group. Its speakers are integrated into the monitor's bezel, but the setup doesn't include a subwoofer or microphone. The monitor is quite a bargain at $419, and it produced decent sound—though not as good as what you'd get from a pair of $75 desktop speakers.

Rounding out the Top 10 are monitors that excel in at least one area but don't quite measure up to the Best Buys. TeleVideo's SVP270, ViewSonic's PT775, and Panasonic's PanaFlat PF70 all produce excellent graphics, but they either cost too much (a hefty

17-INCH MONITORS — FEATURES

	MONITOR	Street price (7/10/98)	Tube manufacturer	Pitch type (mm)	Viewable area in inches (specs/PCW)	Max. refresh rate at 800 by 600 (Hz)	Max. refresh rate at 1024 by 768 (Hz)	Depth (inches)	USB optional	BNC port
1	IBM P72*	$589	Sony	.25 stripe	16/15.7	85	85	17.1	○	○
2	Mitsubishi Diamond Pro 87TXM*	$539	Mitsubishi	.25 stripe	16/15.7	130	107	16.7	○	●
3	TeleVideo SVP270	$479	Mitsubishi	.25 stripe	15.8/15.7	153	119	18	○	●
4	Samsung SyncMaster 700p Plus	$449	Samsung	.26 dot	15.9/15.6	110	100	17.5	○	●
5	AcerView 79g	$449	Mitsubishi	.25 stripe	16/15.5	150	118	16.5	●	●
6	ViewSonic PT775	$649	Mitsubishi	.25 stripe	16/15.9	148	117	18	○	●
7	Iiyama VisionMaster Pro 400	$499	Mitsubishi	.25 stripe	16/15.7	142	115	16.6	●	●
8	Apple MultipleScan 720	$449	Mitsubishi	.28 dot	16/15.7	85	85	16.9	○	○
9	Mitsubishi DiamondScan 70M [1]	$419	Toshiba	.28 dot	16/15.9	100	85	16.9	○	○ [2]
10	Panasonic PanaFlat PF70	$679	Matsushita	.24 slot	15.9/15.6	134	106	17.1	○	●

*Best Buy ● Yes ○ No [1] Multimedia monitor with built-in speakers. [2] Audio only.

$679 for the PanaFlat PF70) or have limited toll-free support hours. Iiyama's VisionMaster Pro 400 fell short in support hours available and scored lower in graphics.

Samsung's $449 SyncMaster 700p Plus earned scores of very good across the board but, unlike most other displays on the chart, didn't capture an excellent in any category. Finally, Apple's MultipleScan 720 did an acceptable job of displaying text and graphics, but its warranty lasts only one year. All the other monitors here are covered for three years.

BEYOND THE TOP 10

THE 14 MONITORS that didn't make the cut faltered with skimpy features or support policies, or couldn't match the image quality of our Top 10 (for details, visit PC World Online at www.pcworld.com/t10monitors). Eizo Nanao's $599 FlexScan FX-C5S delivers relatively poor image quality, and the monitor is pulled further down by its high price and unresponsive controls.

For $425 or less, inexpensive offerings from Compaq, Continental, CyberVision, MAG, Optiquest, Princeton, Samsung, and TeleVideo appeal to the comparison shopper, but none delivered good enough picture quality to earn a spot on the chart. Though Impression's Vienna Pro 17 and ADI's MicroScan 5GT have lower-than-average prices and competitive support policies (the Impression is covered for five years on parts, three years on labor), they simply don't do a good enough job of displaying graphics. Hitachi's SuperScan Elite 641 and NEC's MultiSync E700 do a better job with graphics but are hindered by limited phone support hours during the week—and none at all on weekends.

Compaq's V75 is the only monitor we reviewed that has the ballyhooed Universal Serial Bus as a standard feature, though it's an option on Acer's 79g and Iiyama's VisionMaster Pro 400. The V75 includes one basic pass-through port—a passive conduit for low-power devices like keyboards and mice. If you plan to use devices that need AC power as well as a data connection, like scanners or video cameras, you're better off with a self-powered USB hub. If you plan to add USB, expect to pay between $60 and $100.

KINDER, GENTLER MONITORS

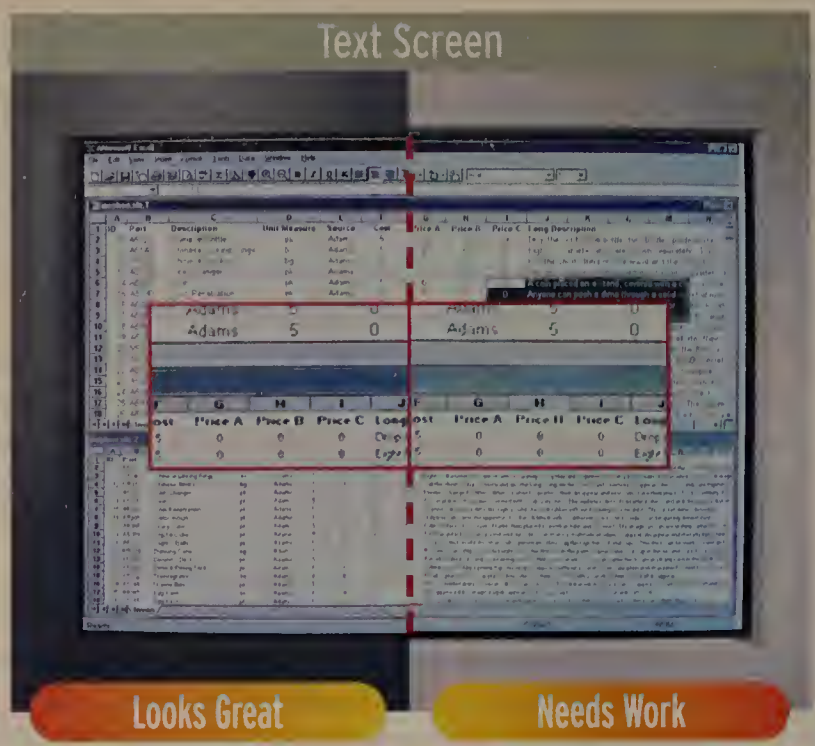
IF THIS YEAR'S 17-inch monitors are kinder to your wallet, they're also gentler on the environment. Nine of this month's chartmakers (up from six last year) meet the requirements of TCO'95 (a standard developed by the Swedish Confederation of Professional Employees). TCO'95 sets stringent limits on electromagnetic emissions and the use of harmful substances such as mercury. The Panasonic PanaFlat PF70 complies with the earlier TCO'92 but not with TCO'95. In contrast, of the 14 displays that missed the cut, only 5 met either TCO standard. TCO'99, now in development, will include stricter requirements for flicker and reflection as well as recommendations for using more environmentally friendly plastics. TCO'99 is scheduled to be unveiled this November, with ▶

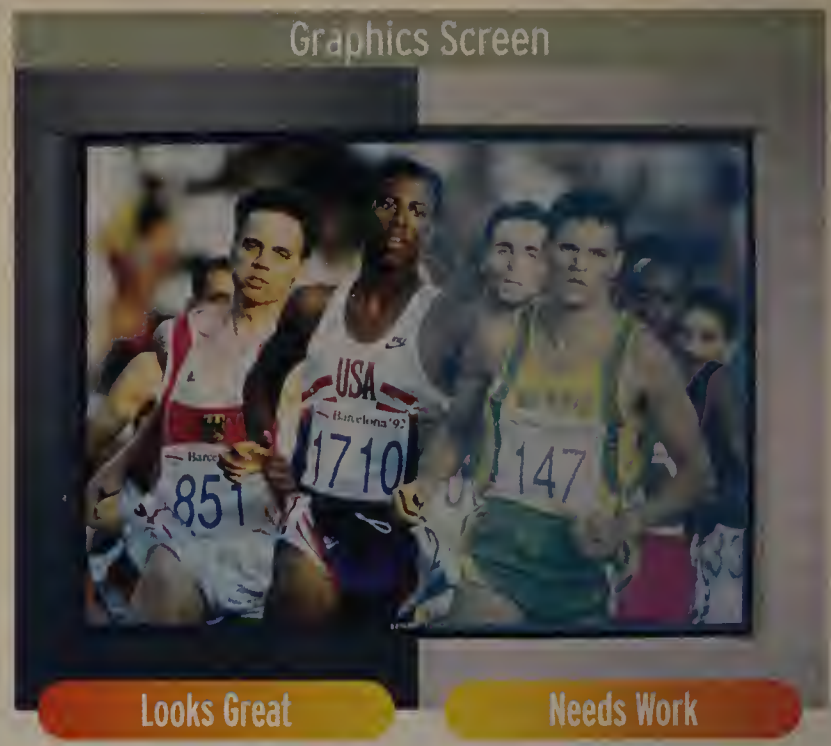
How We Test: Monitor Image Quality

WE ASKED A JURY of five office workers and five *PC World* editors and analysts to evaluate text and graphic image quality for each monitor. The jury looked at a series of test images displayed in a simulated office environment with controlled lighting conditions. Our test suite included a complex spreadsheet with multiple-point-size text and numbers, an office newsletter, several photographic images that display a variety of colors, and a multicolored Web page with varying shades of reverse type. This year, we toughened our test suite and added a multifont screen with black-and-white cascading text of different point sizes. Photographic images were displayed in 24-bit color at a resolution of 1024 by 768 (using a 4MB STB Velocity 128 graphics board, one of our Best Buys in this month's *Top 10 Graphics Boards*). Jurors evaluated color fidelity, focus, sharpness, detail, and text legibility. Monitor testing is partially subjective.

TEST PC WORLD CENTER

ON-SCREEN CONTROLS						COMPLIANCE			SUPPORT		
Screen position and size	Pincushion/ barrel	Trapezoid/ keystone	Focus/ convergence	Image tilt/manual degauss	Color temperature/ RGB control	Plug and Play	MPR-II low emission	TCO shielding ('92/'95)	Warranty (years)	Toll-free tech support (hours)	Weekend support
●/●	●/●	●/●	○/●	●/●	●/●	●	●	'95	3	24	●
●/●	●/●	●/●	●/●	●/●	●/●	●	●	'95	3	12	○
●/●	●/○	●/●	●/●	●/●	●/●	●	●	'95	3	12	○
●/●	●/○	●/●	○/○	●/●	●/○	●	●	'95	3	24	●
○/●	●/○	●/●	○/●	●/●	●/○	●	●	'95	3	24	●
●/●	●/●	●/●	●/●	●/●	●/●	●	●	'95	3	11	○
●/●	●/●	●/●	○/●	●/●	●/●	●	●	'95	3	12	○
●/●	●/●	●/●	●/●	○/●	●/●	●	●	'95	1	12	○
●/●	●/●	●/●	○/○	●/●	●/●	●	●	'95	3	12	○
●/●	●/●	●/●	○/○	●/●	●/●	●	●	'92	3	24	●





Worth a Thousand Words

SIDE-BY-SIDE SCREEN COMPARISONS reveal striking contrasts between different monitors' image quality. **IBM's P72** ("Looks Great," on the left side of each sample above) rendered text with superior clarity and displayed vibrant, lifelike graphics. Meanwhile, **Eizo Nanao's FlexScan FX-C5S** ("Needs Work," on the right side of each sample), provided mediocre image quality; text on a spreadsheet wasn't clear or sharp, and colors were tepid in test photographs.

complying monitors appearing three to four months later.

Monitors with short-necked tubes have been gaining in popularity, and no wonder: With the length of its electron gun reduced, a 19-inch tube can fit into the footprint of a 15-inch display, letting you put a bigger monitor on a more shallow desktop. Meanwhile, Sony breaks new ground with a new kind of stripe pitch tube (see "No Curves Ahead," page 125). Called the FD Trinitron, it delivers a terrific picture and eliminates the illusion of curvature that we've seen on pure flat screens like Panasonic's PanaFlat PF70.

So you've found the monitor of your dreams—color to die for, sharply focused text, sensible controls. Before you relinquish your credit card, do a little more investigating. First, make sure that the display supports a noninterlaced vertical refresh rate of at least 75 Hz at 1024 by 768 resolution. Next, confirm that your graphics board can support the new monitor. If you work with graphic images and need to display 24-bit "true" color, the card must have at least 4MB of video memory. Then check out the monitor's warranty. A substantial one covers parts (including the tube) and labor for at least three years. Finally, buy from a dealer that offers a 30-day no-questions-asked return policy with no restocking fee. That's especially important when you buy a new monitor because you won't really know how good its image is until you plug the unit into your computer and judge by your own standards.

Look for a **warranty** that covers parts and labor for **at least three years.**

online

For reviews of monitors that fell short of the Top 10, point your Web browser to PC World Online at www.pcworld.com/t10monitors. Susan Silvius has been evaluating monitors for several years. Mick Lockey is an assistant editor for PC World. *Testing was performed by Ulrike Diehlmann and Jeffrey Kuta of the PC World Test Center.*

1 IBM P72

PRO: Cool black matte case, superb text and image clarity

CON: High price

Images look nearly lifelike when displayed on IBM's P72, our number one Best Buy. It's not only beautifully engineered, but eye-catching with its sleek, coal-black case. Whether your work involves graphics, detailed spreadsheets, or Web pages, the P72 can handle the load.

At $589, the P72 is the third-priciest monitor in the Top 10, but you get what you pay for: On all 13 screens of text and graphics we used for testing image quality, the P72 scored among the top five monitors (out of 24 contenders). More often than not, it captured the top spot. From small-point text to subtle variations in skin tones, the IBM displayed vivid color and superior sharpness in detail not detectable on other monitors.

The on-screen display is well mapped-out. The digital controls lack an adjustment for focus, which could pose a problem over time if the focus shifts due to normal wear and tear. The controls do include an "enhanced video" button that lets you toggle between standard presentation (for text-oriented applications) and graphics/video modes (for movies and games, according to IBM). But we found that all our test files—presentation and otherwise—looked best when we kept the monitor in standard mode. Finally, the controls include a zoom function, which could be handy if you occasionally play back video clips at less than full screen (though the control zooms only the center of the image).

One minor complaint: The refresh rate tops off at 85 Hz at 1024 by 768 resolution. That's sufficient for most users, but if you happen to be particularly sensitive to flicker or if you ▶

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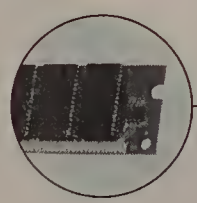

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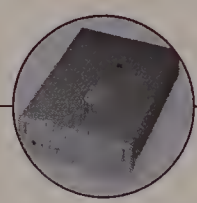

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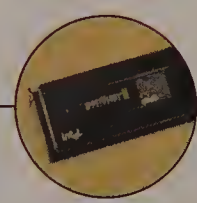

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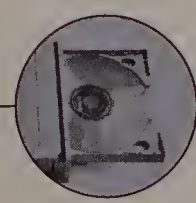

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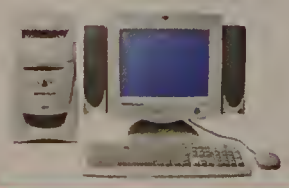

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spend extremely long periods of time at your computer, you should consider a display that supports a higher setting, like the number three TeleVideo SVP270, whose maximum refresh rate soars to 119 Hz at 1024 by 768. • **IBM;** 800/426-7255 ext. 4753; www.pc.ibm.com/us/accessories/monitors

2 MITSUBISHI DIAMOND PRO 87TXM

PRO: Fine graphics and text quality, precise controls

CON: Confusing labels for on-screen controls

Mitsubishi's $539 Diamond Pro 87TXM earned a Best Buy in our September 1997 monitor roundup, and it's made the Top 10 chart ever since. It displays text documents and graphic images equally well, garnering scores of very good. In our tests, the 87TXM did an especially nice job of displaying a Web page, rendering a section of tiny blue type on a black background easily readable. Small text on newsletter and spreadsheet tests was sharp across the entire screen.

The boxy, gray monitor looks generic, but its elegant control panel extends out of the monitor's bezel with a touch of a finger. And the on-screen display has one of the most comprehensive sets of controls we've seen. Between the on-screen controls and the fine-tuning utility software bundled with the unit, you can adjust the screen to fit your needs precisely. Functions are labeled with word and icon descriptors, a mixed blessing. The controls are generally easy to figure out thanks to well-defined icons, but the word descriptors accompanying the icons are hard to decipher. Looking for trapezoid? Try 'pcc-phase.' 'Pcc-amp,' meanwhile, handles pincushioning. Such labels might be easy enough for engineers to understand, but they're too esoteric for the majority of home and business users. • **Mitsubishi Electronics;** 800/843-2515; www.mitsubishi-display.com

INFONET NO. 621

3 TELEVIDEO SVP270

PRO: Sharp text, top-notch graphics

CON: Adjusting the purity function tilts the image

At $479, the TeleVideo SVP270's price is average—but that's the only thing middle-of-the-pack about this outstanding monitor. The SVP270 captured first or second place in all but one of our graphics tests, nearly equaling the Best Buy IBM P72. It showed sharp focus on the smallest text on our spreadsheet, though text was crisper in some screen areas than in others.

The controls for this flat-topped unit are mounted on a panel recessed just below the face of the monitor. The panel looks daunting at first because of its eight control buttons, but adjusting the picture isn't difficult. Most functions are only one menu deep, an efficient design. Also, the on-screen controls menu screen stays up longer than usual (about 40 seconds)—handy if you need to consult the manual, less so for making quick adjustments. If you do run into problems, the documentation gives detailed instructions. The SVP270 supports refresh rates up to 119 Hz at 1024 by 768, the highest on the chart.

The monitor's three-year warranty period is fine, but toll-free technical support is limited to 12 hours a day on weekdays only. TeleVideo is also the only company on the chart not to offer fax-back support. • **TeleVideo;** 800/835-3228; www.televideoinc.com

INFONET NO. 622

4 SAMSUNG SYNCMASTER 700P PLUS

PRO: Crisp text and vibrant graphics, intuitive controls

CON: Adjustment icons not always clear

With its inlaid arc of blue and gray, Samsung's $449 SyncMaster 700p Plus is one of the nicer-looking monitors in this roundup. It also displayed better image quality than the two other dot ▶

No Curves Ahead
Sony's New FD Trinitron

Sony GDM-F500

FLAT-SCREEN MONITORS have some distinct advantages over the CRT you probably use now. They reflect less glare and produce more-accurate images. Unfortunately, flat-screen displays, like the Panasonic PanaFlat PF70 reviewed in this roundup, produce an image that looks somewhat concave, not square—the sides of the displayed image are noticeably bowed by an inward curve, which can be distracting when you're doing precision work such as image editing or desktop publishing.

Enter Sony. In May, the company introduced a new type of stripe pitch tube, the FD Trinitron. Because Sony has no plans to use the new tube in a 17-inch model, we looked at the 21-inch GDM-F500.

We put the GDM-F500 through our battery of monitor tests and came away impressed. Not only did the screen look as flat as a sheet of glass (an illusion, since the tube is slightly convex), but we couldn't detect the inward curve we've seen on monitors like the PanaFlat PF70. Small type was very crisp and clear in our test spreadsheet and newsletter, and focus was sharp across the entire screen. Graphic images were stunning, thanks in part to the .22mm stripe pitch tube, which makes color blending finer and more continuous in tone. Terrific 3D effects were another plus.

The GDM-F500 is street-priced at $1899—roughly $300 more than you'd pay for a typical 21-inch monitor. Some other companies, such as Mitsubishi, are expected to develop their own flat-tube displays within the next six months or so, most likely for less money. For now, the Sony GDM-F500 is the only Trinitron display of its kind. • **Sony Electronics;** 888/315-7669; www.sony.com/pc

INFONET NO. 755 —S.S.

pitch monitors on the chart, the Apple MultipleScan 720 and the Mitsubishi DiamondScan 70M. The SyncMaster 700p Plus was equally adept at displaying text and graphics, but it fell a bit short of the Best Buy IBM P72 in both categories. Color fidelity could be better: Our test photo of a glazed fruit tart looked slightly off. Nevertheless, the 700p Plus scored well above average on our other graphics test files, revealing fine detail on a photo of a shaded waterway, and all the tiny lines on a close-up of an engraving.

The display features a well-designed digital control set. More important, the controls are easy to use. The buttons are mounted on a panel that retracts into the casing when not in use. One push with a fingertip, and the panel glides out at a 45-degree angle. You can access on-screen controls quickly, and brightness and contrast have their own dials. Although the control icons are a bit cryptic, the accompanying word labels help identify their functions. The controls don't permit adjustments for focus or convergence, and you can't set RGB values individually—which is odd, considering that the display ships with color-calibration software. Samsung offers a three-year warranty along with around-the-clock toll-free support every day of the week.

• **Samsung;** 800/933-4110; www.sosimple.com

INFONET NO. 623

5 ACERVIEW 79G

PRO: Easy-to-use controls, good price

CON: Limited number of controls

The g in the name of Acer's AcerView 79g doesn't stand for graphics, but maybe it should. This classy-looking unit earned excellent scores on the graphics portion of our jury test, showing its true colors particularly well in our test photo of a park scene: Moss on the distant trees stood out, as did individual leaves floating on the shaded water. The unit didn't impress us as much when rendering text, however, due to uneven focus. Small-point text, for example, looked fuzzier in one corner of our spreadsheet than elsewhere on the screen. Nevertheless, the 79g's below-average street price of $449 makes it well worth considering. Among our Top 10, only the Mitsubishi DiamondScan 70M is more affordable.

The AcerView 79g's digital controls—four elongated, tapered buttons—lie flush with the face of the bezel, but an indentation around each button guides your finger to the right spot. Controls are fairly straightforward, and the icons and word labels are mostly self-explanatory. The 79g provides fewer adjustment options than other monitors; the most obvious omissions are RGB control and on-screen display position. Despite the 79g's excellence in displaying graphic images, the monitor's lack of RGB control makes it a poor choice for design professionals. Acer backs the monitor with extensive toll-free technical support hours—24 hours daily. • **Acer America;** 800/379-2237 ext. 125; www.acerperipherals.com

INFONET NO. 624

6 VIEWSONIC PT775

PRO: Extensive controls, beautiful color and graphics

CON: Very expensive, limited phone support

ViewSonic's PT775 is one of two monitors (the Mitsubishi Diamond Pro 87TXM is the other) to make our chart two years in a row. Debuting in our July 1997 issue, the PT775—like the 87TXM—boasts extensive adjustment controls and outstanding graphics that make it a great choice for imaging professionals who want a 17-inch display to use at home. But you'll pay for the privilege: The PT775 costs $649—$200 less than it did last year, but more than 22 of the other monitors we reviewed this month.

The PT775's four display buttons—labeled with "1," "2," and up and down arrows—don't seem terribly intuitive at first glance, but they're not difficult to master. Though some of the word descriptions are a bit vague ('viewmeter' and 'hourglass/hooking,' for example), the clear icons help. Toll-free phone support hours, disappointingly, are limited to weekdays, 11 hours a day.

• **ViewSonic;** 800/888-8583; www.viewsonic.com

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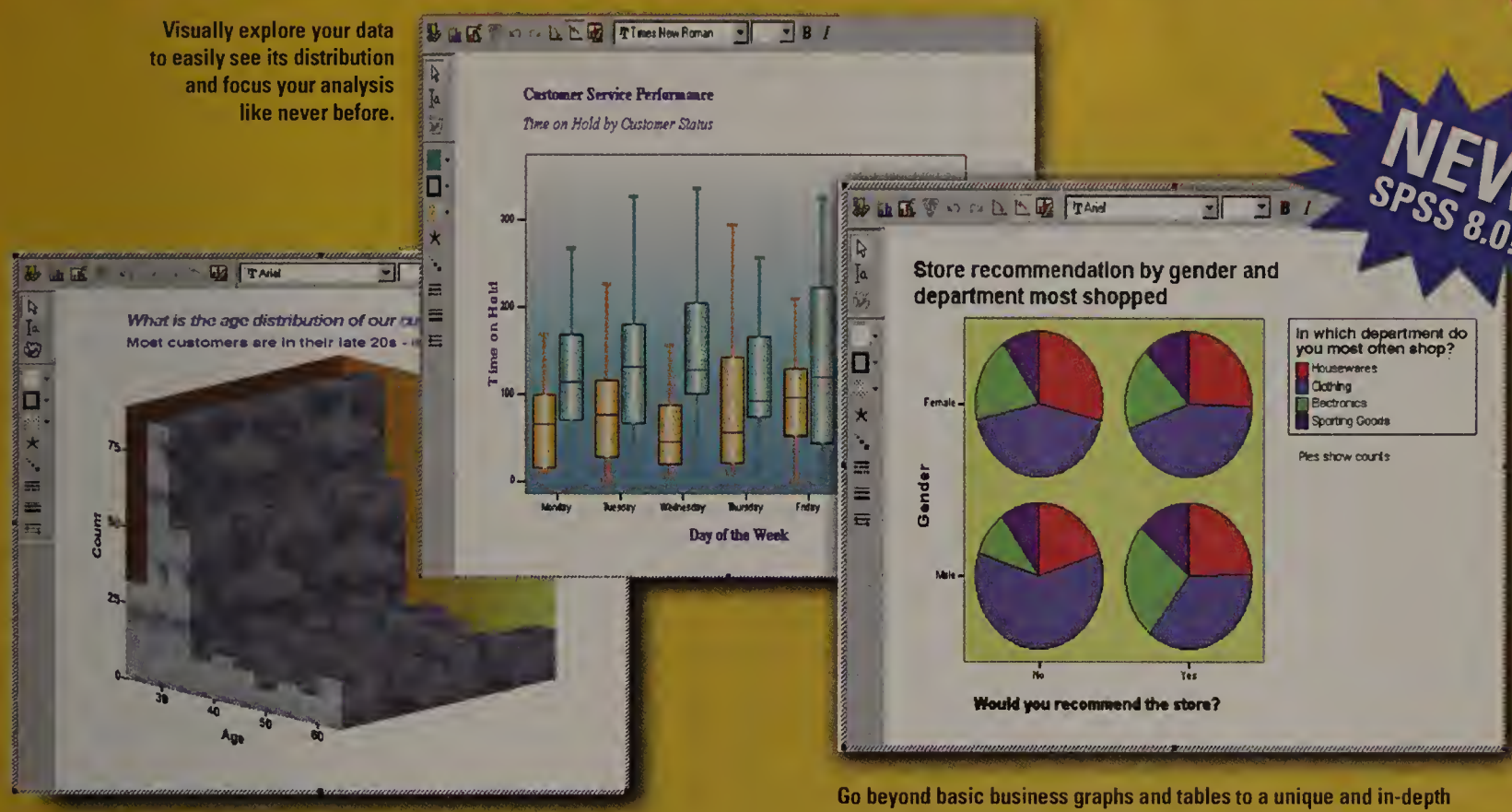

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7 IIYAMA VISIONMASTER PRO 400

PRO: Deep, vibrant colors

CON: Average clarity on text, cumbersome controls take time to get used to

The Iiyama VisionMaster Pro 400 is an all-around average monitor. Good-but-not-great image quality and a middling $499 price keep it from ranking higher. The text along the lower edge of our Windows 95 desktop image was not very sharp, and though most of the text on a spreadsheet was clear enough, the focus was better in the middle of the screen than along the lower edge. The VisionMaster Pro 400 didn't score highly on our graphics tests, but it showed good color saturation, making a photograph of a fruit tart look tempting and flesh tones in a photo of Olympic runners convincingly realistic.

The Iiyama is one of the smallest monitors we reviewed but, oddly, also one of the heaviest. The simple display tilts and swivels easily. Three controls—one menu button and two labeled with plus and minus signs—let you make adjustments. Functions are organized into five menus, which are numbered and must be viewed in order—a clunky design. Navigating menus becomes easier once you figure out that you have to highlight and select the current menu number in order to move to the next one. Otherwise, menus are well organized, with the most common functions on the first or second menus and the least common on the last menu. • **Iiyama;** 800/394-4335; www.iiyama.com

INFONET NO. 626

Windows 98 and Multiple Monitors: Double, Double Toil and Trouble

MICROSOFT IS TRUMPETING Windows 98's ability to support multiple monitors from a single PC. Great concept, but we discovered that you can't just slap two graphics boards into your PC and expect them to work. The overriding problem: compatibility. Like us, you could end up playing graphics-board roulette.

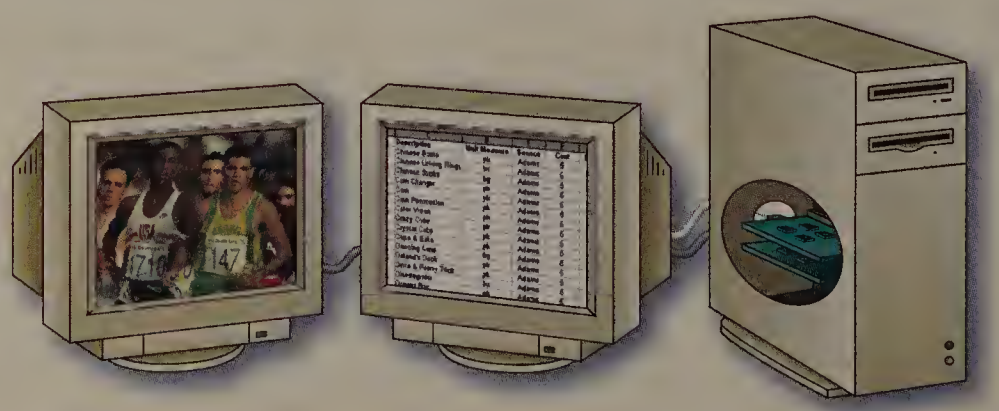
Setting Up Is Hard to Do

We tried five combinations of graphics boards on two PCs with different motherboards—a PII-400 NexTrend NexStar 409W and a Dell Dimension XPS R350. We used a card approved by Microsoft as the primary graphics board, and a secondary board that was either from the approved list or based on an approved chip set and driver. (To see the list, register your version of Windows 98 at www.microsoft.com.)

We were successful only 40 percent of the time—not the best track record. One problem we found was that the same pair of boards that worked in one PC did not necessarily work in another. For example, the VideoLogic Apocalypse 5D worked as a secondary board on the NexStar, but it wouldn't initialize on the Dell because of incompatibilities between the graphics board, drivers, and motherboard.

Check with your graphics board vendor to see if your board supports multiple monitors. If it doesn't, you'll either have to buy a newer board or simply cool your heels until the vendor releases an updated driver.

YOU'LL NEED PERSEVERANCE and two compatible graphics cards to get a pair of monitors up and running at the same time.



Also, check how many free PCI slots your PC has available. Using conventional single-port adapters, like the ones we used, you're limited to one monitor per graphics board. New PCs typically have no more than one AGP and six PCI slots (at least some of which are already occupied). If you have fewer slots open, you'll have to use a board with multiple ports—which runs about $400.

Practical Benefits

When we finally had two monitors working, we were instantly spoiled by the expanded desktop size. Using more than one monitor has some practical benefits. For example, you can work with your desktop calendar, e-mail program, and contact manager on a secondary monitor, leaving your main display free for a full-size spreadsheet. Multiple monitors are also ideal for Web designers who want to work on one monitor while viewing changes on another. —S.S.

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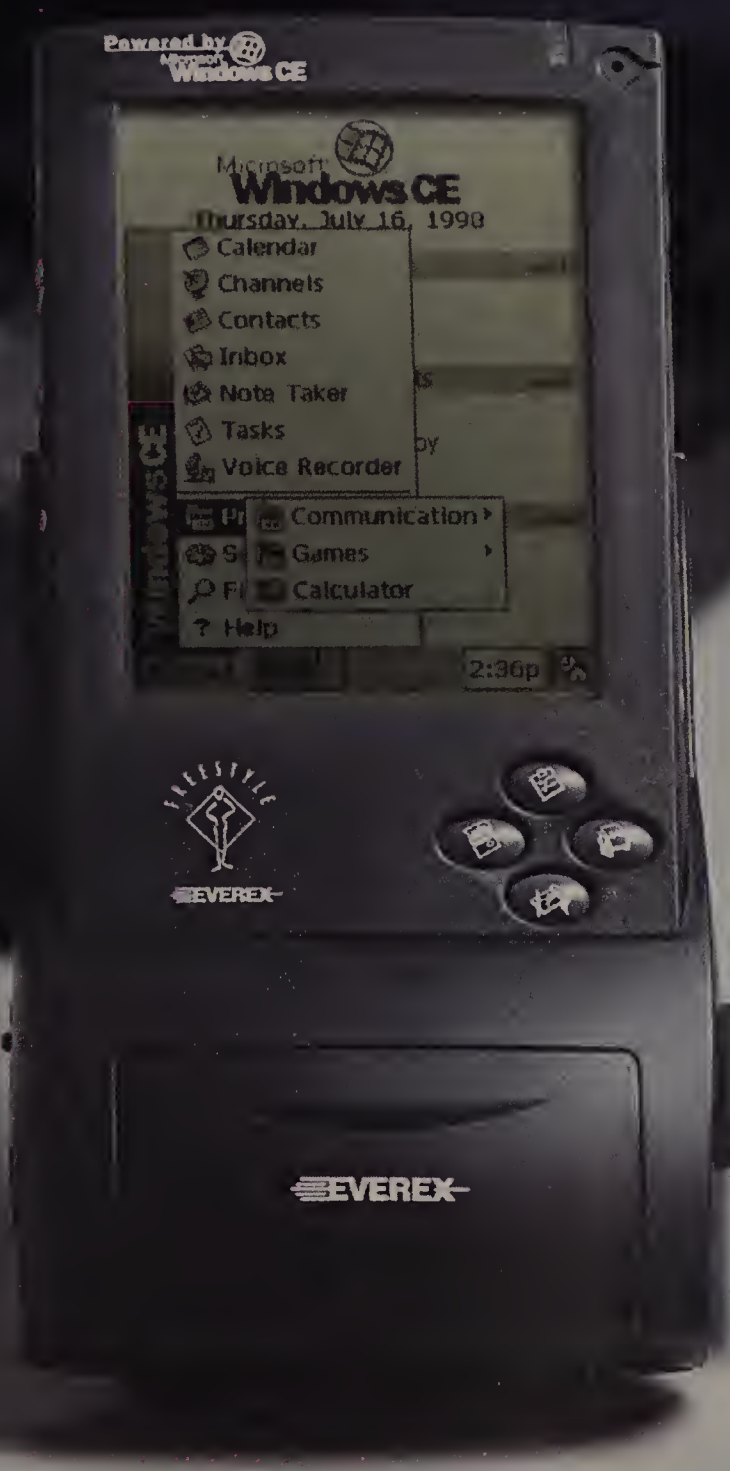

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8 APPLE MULTIPLESCAN 720

PRO: Extensive controls, excellent documentation

CON: One-year warranty in a three-year world, average image quality

A relatively low price of $449 and Apple's strength in designing user-friendly products help put this stylish gray model onto the chart. But meager support policies and mediocre image quality kept it from rising above eighth place. The warranty period is one year—unacceptably brief, given that every other monitor on the chart is covered for three years. Toll-free phone support is available for only 12 hours a day, and not at all on weekends.

The monitor does a competent job with text and graphics and should be adequate for common business applications, but its colors weren't as bright as other monitors'. The user guide is well organized and amply illustrated, and despite its Mac-centricity, it doesn't slight PC users. On-screen controls are accessed through a single, well-organized menu, making navigation a snap. Don't get too excited about the bundled utilities, however: They won't run under any version of Windows. • **Apple Computer;** 800/889-2629; www.apple.com

INFONET NO. 627

9 MITSUBISHI DIAMONDSCAN 70M

PRO: Attractive price, built-in speakers

CON: Cumbersome controls

Mitsubishi zeros in on the home market with the DiamondScan 70M. This budget model sells for $419, the lowest price of any chartmaker, and includes built-in speakers. Does it fly? Well, its image quality on text and graphics is the lowest of the Top 10 monitors (along with the Apple MultipleScan 720), but still acceptable for users who don't need the high-level precision required for image editing or prepress production. The sound quality of the built-in speakers is adequate, though audiophiles will probably prefer the stand-alone desktop variety. Volume level is accessible only through the on-screen controls.

DiamondScan 70M's on-screen controls were illogical in some respects. To scroll down the menu, you have to press the Menu button rather than the down-arrow button. And when you select the Reset option, it displays the 'color/basic' menu rather than changing the image, so you have to readjust everything yourself. We distorted the shape and color of the screen image; and though pressing Reset restored the default color temperature, it did nothing to reshape the skewed image. • **Mitsubishi;** 800/843-2515; www.mitsubishi-display.com

INFONET NO. 628

10 PANASONIC PANAFLAT PF70

PRO: Bright colors, minimal glare

CON: Screen concavity is distracting to some, expensive

Panasonic's PanaFlat PF70 stands out for its completely flat screen. The screen appears slightly concave (which takes some getting used to), but offers two terrific benefits: excellent color and minimal reflected glare. These don't come cheap, however—the PF70's $679 price tag is the steepest in this roundup. The PF70 is less full-featured than the ViewSonic, lacking TCO'95 compliance (though it does measure up to the less stringent TCO'92) and having fewer adjustment functions and preset video modes. It also has a slightly smaller viewable area.

The PanaFlat competed admirably on our graphics tests. Colors stood out and 3D effects were striking, as in the photograph of Olympic runners. Text clarity, though not quite as good, was still well above average.

The controls can be confusing. The sparse menu relies heavily on icons and could benefit from more-meaningful word labels; but the controls are thoroughly covered in the documentation, with all menu items explained, each submenu reproduced, and instructions given. The squarish case includes specialized BNC connectors for complex graphic design. • **Panasonic;** 800/742-8086; www.panasonic.com/alive

INFONET NO. 629 ■

THEY'RE 300 TIMES YOUR SIZE.
THEY SPEND YOUR YEARLY BUDGET ON OFFICE PARTIES.
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AND BY THE TIME THEY DO, IT'LL BE TOO LATE FOR THEM TO STOP YOU.

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Faster...Faster...Faster...

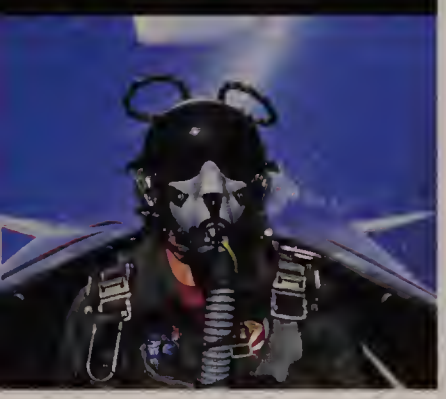
1 Clocked at speeds over 60mph, the cheetah is the fastest land animal. This "big cat" hunts mainly gazelle, but the average chase lasts only about 20 seconds.

2 In early September 1998, *PC World* Magazine ranks the Micron Millennia the #1 Power Desktop on the market calling it "the fastest of all" systems tested.

INTRODUCING THE FULLY LOADED MICRON 450MHz MILLENNIA

MICRON GOES TO WORK

Raytheon Data Systems
Defense Contractor



Micron Systems:
Over 100,000 deployed Micron desktops, notebooks & servers

Favorite Feature:
Price/power ratio

Purpose:
Help maintain US security and freedom

For The Whole Story: www.micronpc.com

Tim Willits
Lead Map Designer, id Software
Creators of Quake & Quake II

Micron Systems:
Micron Millennia 400s desktops

Favorite Feature:
400MHz - Of course

Purpose:
Test mind-bending levels of Quake II and help create one of the coolest games ever

For The Whole Story:
www.micronpc.com

MICRON RANKED #1 DESKTOP CUSTOMER SATISFACTION‡‡

intel inside pentium® II processor

Featuring Intel's Fastest Processor Ever

Just named #1 Power Desktop by the editors of *PC World* Magazine (Millennia 400 DVD • September '98) Micron's Millennia desktop product line continues a long tradition of industry-leading, award-winning performance. Perhaps that's why some of the most prominent power users around rely on Micron. No matter how strenuous your demands, no matter how colossal the task, we invite you to put a Millennia desktop to the test. You'll be hard-pressed to find a Pentium® II processor based system as powerful and affordable as the Micron Millennia. And Micron's revolutionary new mPower℠ purchase program makes Millennia ownership even easier, offering qualified users no interest** or payments for six months as well as PowerXchange℠ trade-in options on your current PC towards a new Millennia desktop.

MICRON'S EXCLUSIVE CONSUMER 6 NO PAYMENTS NO INTEREST 6 MONTH SAME AS CASH OFFER

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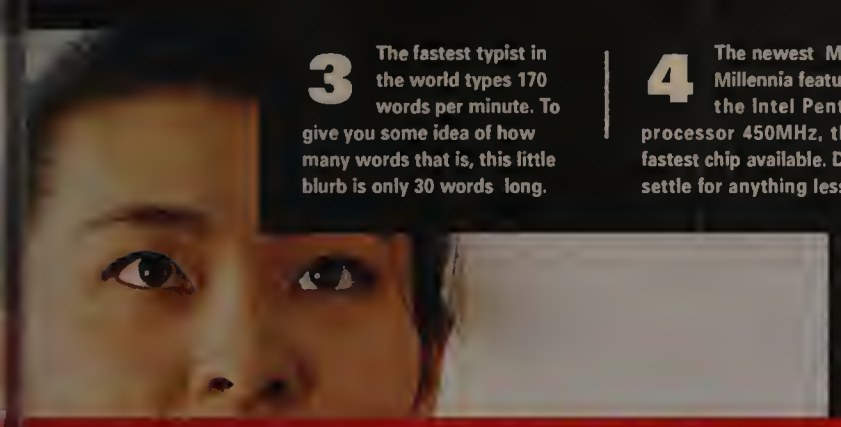

3 The fastest typist in the world types 170 words per minute. To give you some idea of how many words that is, this little blurb is only 30 words long.

4 The newest Micron Millennia features the Intel Pentium II processor 450MHz, the fastest chip available. Don't settle for anything less.

THERE IS NO KNOWLEDGE THAT IS NOT POWER.

— RALPH WALDO EMERSON

10
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How important is a 15% performance difference? Think of it as 1 hour and 12 minutes in an 8-hour day.

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The Micron Difference: Rock-Solid Reliability. mPower℠ and PowerXchange℠ Programs. Industry-Leading Service and Support.

There's a lot more to owning a system than having a computer sitting on your desk. You'll always want the latest technology, the best pricing and service and support you can count on — and that's exactly what Micron's new mPower program is all about. Call today for details or visit www.micronpc.com

Model Name	Millennia C300	Millennia 350	Millennia 400	Millennia 450	Millennia 450 MAX
Processor	Intel® Celeron™ processor 300MHz	Intel Pentium® II processor 350MHz	Intel Pentium II processor 400MHz	Intel Pentium II processor 450MHz	Intel Pentium II processor 450MHz
RAM	32MB SDRAM memory	64MB 100MHz SDRAM memory	64MB 100MHz SDRAM memory	64MB 100MHz SDRAM memory	128MB 100MHz SDRAM memory
Hard Drive	4.3GB Ultra ATA hard drive	8.4GB Ultra ATA hard drive	10GB Ultra ATA hard drive	10GB Ultra ATA hard drive	14.4GB 7200 RPM Ultra ATA hard drive
Monitor	15" Micron 500Vx monitor (13.8" display)	17" Micron 700Vx monitor (15.9" display)	17" Micron 700Vx monitor (15.9" display)	17" Micron 700Vx monitor (15.9" display)	19" Micron 900Lx monitor (18" display)
DVD/CD-ROM	32X max speed CD-ROM drive	32X max speed CD-ROM drive	32X max speed CD-ROM drive	32X max speed CD-ROM drive	DVD-ROM drive and decoder card***
Graphics	nVidia Riva 128, 4MB SGRAM 3D AGP graphics	nVidia Riva 128, 4MB SGRAM 3D AGP graphics	nVidia Riva 128, 4MB SGRAM 3D AGP graphics	nVidia Riva 128, 4MB SGRAM 3D AGP graphics	Real 3D Starfighter i740, 8MB AGP graphics
Sound System	PCI 64-voice Wavetable sound	PCI 64-voice Wavetable sound	PCI 64-voice Wavetable sound	PCI 64-voice Wavetable sound	64-voice Wavetable 3D stereo sound
Cache	128KB internal cache	512KB internal cache	512KB internal cache	512KB internal cache	512KB internal cache
Warranty	5-year/3-year Micron Power℠ limited warranty	5-year/3-year Micron Power limited warranty	5-year/3-year Micron Power limited warranty	5-year/3-year Micron Power limited warranty	5-year/3-year Micron Power limited warranty
Software Included	Microsoft® Windows® 98 Microsoft Office 97 Small Business Edition	Microsoft Windows 98 Microsoft Office 97 Small Business Edition	Microsoft Windows 98 Microsoft Office 97 Small Business Edition	Microsoft Windows 98 Microsoft Office 97 Small Business Edition	Microsoft Windows 98 Microsoft Office 97 Small Business Edition
Also Includes:	New MicroTower™ case Advent AV009 stereo speakers 3Com/U.S. Robotics 56K WinModem** 104-key enhanced keyboard Microsoft IntelliMouse® 3.5" floppy drive	New MicroTower case Advent AV009 stereo speakers 3Com/U.S. Robotics 56K WinModem** 104-key enhanced keyboard Microsoft IntelliMouse 3.5" floppy drive	New MicroTower case Advent AV009 stereo speakers 3Com/U.S. Robotics 56K WinModem** 104-key enhanced keyboard Microsoft IntelliMouse 3.5" floppy drive	New MicroTower case Advent AV009 stereo speakers 3Com/U.S. Robotics 56K WinModem** 104-key enhanced keyboard Microsoft IntelliMouse 3.5" floppy drive	Micron MiniTower case Advent AV390PL-70 watt 3-piece sound system Advent subwoofer 3Com/U.S. Robotics 56K WinModem** 104-key enhanced keyboard Microsoft IntelliMouse 3.5" floppy drive
Price	$1199 $42mo. TechRefresh Lease	$1649 $58mo. TechRefresh Lease	$1849 $65mo. TechRefresh Lease	$1899 $66mo. TechRefresh Lease	$3099 $108mo. TechRefresh Lease
Upgrade to:	6.4GB Ultra ATA hard drive 17" Micron 700Vx monitor (15.9" display) 100MB Iomega Zip drive	10GB Ultra ATA hard drive 100MB Iomega Zip drive Microsoft Natural Keyboard Elite	19" Micron 900Lx (18" display) 100MB Iomega Zip drive Advent subwoofer	19" Micron 900Lx (18" display) 100MB Iomega Zip drive Advent subwoofer	100MB Iomega Zip drive 256MB 100MHz SDRAM
Price	$1497 $53mo. TechRefresh Lease	$1833 $64mo. TechRefresh Lease	$2232 $78mo. TechRefresh Lease	$2282 $80mo. TechRefresh Lease	$3438 $120mo. TechRefresh Lease

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A BRIEF TWENTY YEAR HISTORY OF TIME & MICRON...

1978 First test-tube baby born & Micron founded by twin brothers in Blackfoot, Idaho

1982 National newspaper USA Today launched & Micron ships first DRAM

1987 Allan Bloom publishes "The Closing of the American Mind" & Micron introduces 1 Meg DRAM

MICRON AND MICROSOFT TEAM UP TO DELIVER YOU THE POWER OF WINDOWS NT TODAY WITH MICRON'S AWARD-WINNING CLIENTPRO

CRITICS RAVE ABOUT THE MICRON CLIENTPRO

"The Micron ClientPro 400 succeeds in providing an optimized LANDesk Management Solution and combines it with top performance at a good price."

— *PC Magazine*
June 30, 1998

A variety of add-on features such as Remote Wake Up,™ chassis intrusion detection, plus case temperature and fan monitoring provide extra reliability and security.

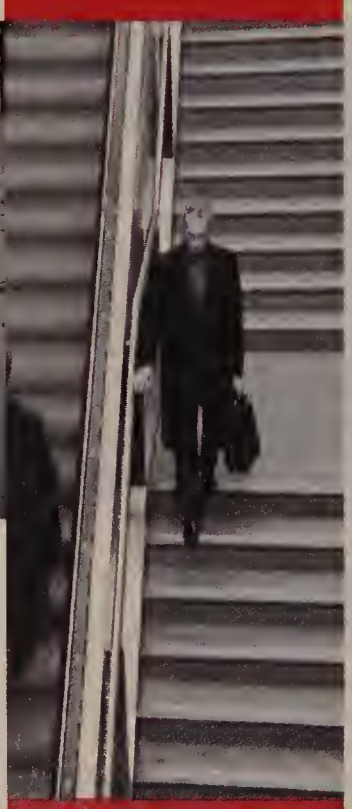
32X variable speed CD-ROM drive

Lots of monitor options including the 17" Micron monitor (15.9" display)

intel inside pentium® II PROCESSOR

Features Fast Intel Pentium II Processors to give you the power to handle a wide range of computing situations

Every ClientPro ships with Windows NT® Workstation 4.0 to provide a virtually crash-proof and highly secure operating system



"There has never yet been a man in our history who led a life of ease whose name is worth remembering."
— Theodore Roosevelt

Rocket Fuel for Growing Businesses

Growth happens. Especially when you're working 24/7, kicking down doors and overcoming all obstacles that stand in the way of success. And as your network grows, turn to Micron for help in harnessing the power of Windows NT. Micron was the first PC company to ship Microsoft Windows NT way back in the summer of '94 and leads the industry in the shift to the Windows NT platform. So you get the power and performance of the of Micron™ ClientPro® managed PC with the added bonus of Micron's Windows NT expertise. Network-ready right out of the box and built on industry-standards for simple integration with existing networks, the unique power and reliable day-in and day-out performance of Micron's ClientPro puts more manageability into your business.

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1990 The cold war ends & Micron listed its common stock on the New York Stock Exchange

1992 America's "Dream Team" takes a cakewalk for Olympic Gold & Micron introduces first 24-bit accelerator cards

1994 Comet Shoemaker-Levy 9 hurdles into Jupiter & The Micron 466 VL Magnum Desktop wins *PC Magazine's* Editors' Choice (The first of many)

1998 The rules have changed, and Micron sets the new standard for desktop power

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WHAT'S NEXT.

IT FACT: Micron Was The First PC Company To Ship Windows NT In The Summer Of '94

New Rules. New Tools.™

The Micron ClientPro stands out among the best network-ready solutions with advanced manageability. We've designed ClientPro with consistent configurations and long product lifestyles to help you manage product transitions smoothly, while lowering the total cost of maintaining an efficient network. So when you're ready to put the power of Windows NT management into your business, look to Micron's award-winning ClientPro.

Model Name	ClientPro CE 300	ClientPro CP 350	ClientPro CS 450
Processor	Intel® Celeron™ processor 300MHz	Intel Pentium® II processor 350MHz	Intel Pentium II processor 450MHz
RAM	64MB SDRAM	64MB SDRAM	128MB SDRAM
Hard Drive	3.2GB SMART Ultra ATA hard drive	3.2GB SMART Ultra ATA hard drive	6.4GB SMART Ultra ATA hard drive
Monitor	17" Micron 700Vx (15.9" display)	17" Micron 700Vx (15.9" display)	17" Micron 700Vx (15.9" display)
CD-ROM	32X variable speed CD-ROM drive	32X variable speed CD-ROM drive	32X variable speed CD-ROM drive
Graphics	Integrated nVidia Riva 128, 4MB SGRAM 3D AGP graphics	Integrated nVidia Riva 128, 4MB SGRAM 3D AGP graphics	4MB AGP 3D video
Sound System	64-voice PCI Wavetable sound	64-voice PCI Wavetable sound	64-voice PCI Wavetable sound
Cache	128KB internal L2 secondary cache, DMI 2.0 compliant, 2MB flash BIOS	512KB internal L2 secondary cache, DMI 2.0 compliant, 2MB flash BIOS	512KB internal L2 secondary cache, DMI 2.0 compliant, 2MB flash BIOS
Warranty	5-year/3-year Micron Power℠ limited warranty	5-year/3-year Micron Power limited warranty	5-year/3-year Micron Power limited warranty
Software Included	Intel LANDesk® Client Manager available Microsoft® Windows NT® Workstation 4.0* Norton AntiVirus	Intel LANDesk Client Manager available Microsoft Windows NT Workstation 4.0* Norton AntiVirus	Intel LANDesk Client Manager available Microsoft Windows NT Workstation 4.0* Norton AntiVirus
Also Includes:	MicroTower with chassis intrusion alert Microsoft PS/2 mouse 32-bit local bus Ultra ATA hard drive controller 3 expansion slots: 2 PCI, 1 ISA 1 parallel, 2 serial ports, 2 USB ports Network adapter with 3Com Remote Wake Up capability 104-key enhanced PS/2 keyboard Advanced Hardware Monitoring and Power Management features 3.5" floppy drive	MicroTower with chassis intrusion alert Microsoft PS/2 mouse 32-bit local bus Ultra ATA hard drive controller 3 expansion slots: 2 PCI, 1 ISA 1 parallel, 2 serial ports, 2 USB ports Network adapter with 3Com Remote Wake Up capability 104-key enhanced PS/2 keyboard Advanced Hardware Monitoring and Power Management features 3.5" floppy drive	MiniTower with chassis intrusion alert 32-bit local bus Ultra ATA hard drive controller Network adapter with 3Com Remote Wake Up capability Advanced Hardware Monitoring and Power Management features Microsoft Mouse 3.5" floppy drive
Price	$1649 $58mo. TechRefresh Lease	$1999 $70mo. TechRefresh Lease	$2499 $87mo. TechRefresh Lease

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FOUR WAYS MICRON'S mPOWER MAKES OBSOLESCENCE OBSOLETE.

TRADE IN YOUR PC

1. Trade in your current computer systems from leading manufacturers and we'll give you wholesale rebates with the purchase of new Micron systems. We'll even send you boxes to package up your old PCs.

FLEXIBLE FINANCING

2. Micron's competitive financing programs help you optimize your cash flow. TechRefresh leasing combines low monthly payments with the option to trade in your system after 12 months. Term financing starts as low as 13.9%. And our up to 6-month same-as-cash program gives you immediate access to the latest technology.

Be Smart.

Pay Less.

Get More.

"Micron's support policies are first-rate, with a three-year parts and one-year labor warranty and 24-hour toll-free phone support seven days a week."

PC World, "Best Buy," August 98

Get Ahead.

INTRODUCING mPOWER

MICRON'S ULTIMATE TOOL FOR MAXIMIZING YOUR PC INVESTMENT

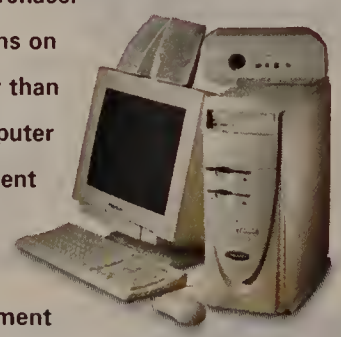
BE:(WARE. BEFORE YOU PICK A PC PURCHASE PROGRAM MAKE SURE YOU KNOW ALL THE FACTS.

Flexibility and options. Something most programs can't offer.

Not all programs are the same. Few offer the flexibility you're looking for. Only the mPower℠ program from Micron allows you to maximize every aspect of your computer's lifecycle from acquisition to trade-in.

Protect your investment

Some companies ask you to buy into their program, but don't offer you a rebate for your existing systems. They may also require you to purchase Internet services you may not need or financing options with rates as high as 25%. mPower, however, allows you to trade virtually any system for a rebate with your Micron purchase. There are also no restrictions on program qualification other than purchasing a Micron™ computer while offering flexible payment options such as the TechRefresh lease and 6-month same-as-cash payment plan. Then, once you've bought a system, other programs lock you in for two years before you can trade-up. mPower allows trade-ins as early as 12 months. In addition, only mPower includes an option to dispose of obsolete machines in an environmentally safe way.



mPOWER makes hardware obsolescence obsolete

The more you learn about mPower, the more you'll see that it's really the only program designed to truly maximize your technology investment. By delivering additional benefits other programs overlook, mPower provides the most comprehensive way to keep the latest technology working for you now and in the future.

intel inside pentium® II PROCESSOR

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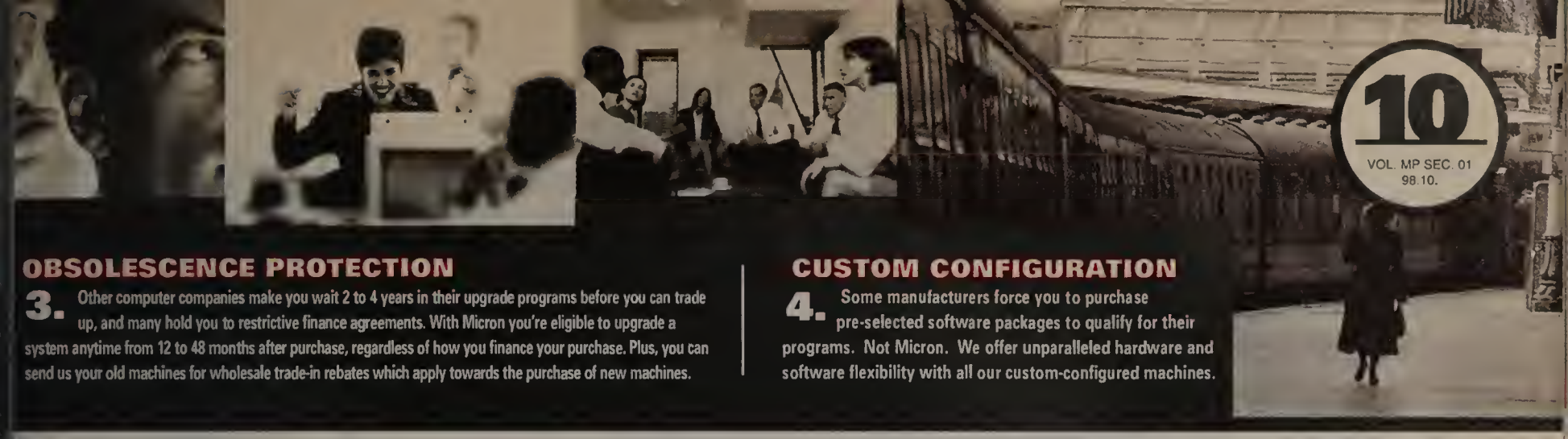
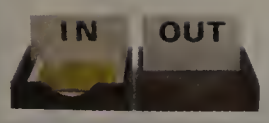


OBSOLESCENCE PROTECTION

3. Other computer companies make you wait 2 to 4 years in their upgrade programs before you can trade up, and many hold you to restrictive finance agreements. With Micron you're eligible to upgrade a system anytime from 12 to 48 months after purchase, regardless of how you finance your purchase. Plus, you can send us your old machines for wholesale trade-in rebates which apply towards the purchase of new machines.

CUSTOM CONFIGURATION

4. Some manufacturers force you to purchase pre-selected software packages to qualify for their programs. Not Micron. We offer unparalleled hardware and software flexibility with all our custom-configured machines.



Running a growing business requires amazing juggling skills. You plan. You organize. You deal with a million things at once. mPower gives you one less thing to worry about.

MICRON ANNOUNCES BREAKTHROUGH PRICING ON AWARD-WINNING SYSTEMS

Model Name	Millennia® 450	Millennia 400	TREK™ 2 266	GoBook™ 266
Processor	Intel® Pentium® II processor 450MHz	Intel Pentium II processor 400MHz	Intel Pentium II processor 266MHz	Intel Pentium processor with MMX® technology 266MHz
RAM	64MB 100MHz SDRAM memory	64MB 100MHz SDRAM memory	64MB SDRAM	32MB EDO RAM
Hard Drive	10GB Ultra ATA hard drive	10GB Ultra ATA hard drive	3.2GB hard disk drive (removable)	2.1GB hard drive
Monitor	17" Micron 700Vx monitor (15.9" display)	17" Micron 700Vx monitor (15.9" display)	14.1" XGA TFT display	12.1" SVGA display
DVD/CD-ROM	32X max speed CD-ROM drive	32X max speed CD-ROM drive	24X CD-ROM (dedicated bay)	24X modular CD-ROM drive
Graphics	nVidia Riva 128, 4MB SGRAM 3D AGP graphics	nVidia Riva 128, 4MB SGRAM 3D AGP graphics	4MB video graphics accelerator	PCI bus with 128-bit graphics accelerator
Sound System	PCI 64-voice Wavetable sound	PCI 64-voice Wavetable sound	Built-in stereo speakers & microphone	16-bit stereo/Wavetable sound
Cache	512KB internal cache	512KB internal cache	512KB L2 pipeline burst cache	512KB L2 pipeline burst cache
Warranty	5-year/3-year Micron Power℠ limited warranty	5-year/3-year Micron Power limited warranty	5-year/1-year Micron limited warranty	5-year/1-year Micron limited warranty
	TechRefresh lease for $66/mo. or $1899	TechRefresh lease for $65/mo. or $1849	TechRefresh lease for $91/mo. or $2599	TechRefresh lease for $84/mo. or $2399

INTRODUCING MPower℠

THE BEST PC PURCHASE PROGRAM. PERIOD.

- POWERXCHANGE℠
- FLEXIBLE FINANCING
- CUSTOM CONFIGURATION
- TECHREFRESH LEASE
- SIX-MONTHS SAME-AS-CASH
- OBSOLESCENCE PROTECTION
- GREEN RECYCLING

Call today to get all the details

MICRON RANKED #1 DESKTOP IN CUSTOMER SATISFACTION!‡

I'm pretty tired of people telling me I'm going to get some "great deal" when it turns out it's only a great deal for them. Which is why I was pleasantly surprised to find out that there's actually quite a bit of meat behind the mPower program. It's about time somebody did this right.

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Call toll-free or visit us online at www.micronpc.com/pcwd

BEST BUY WITH KEYBOARD

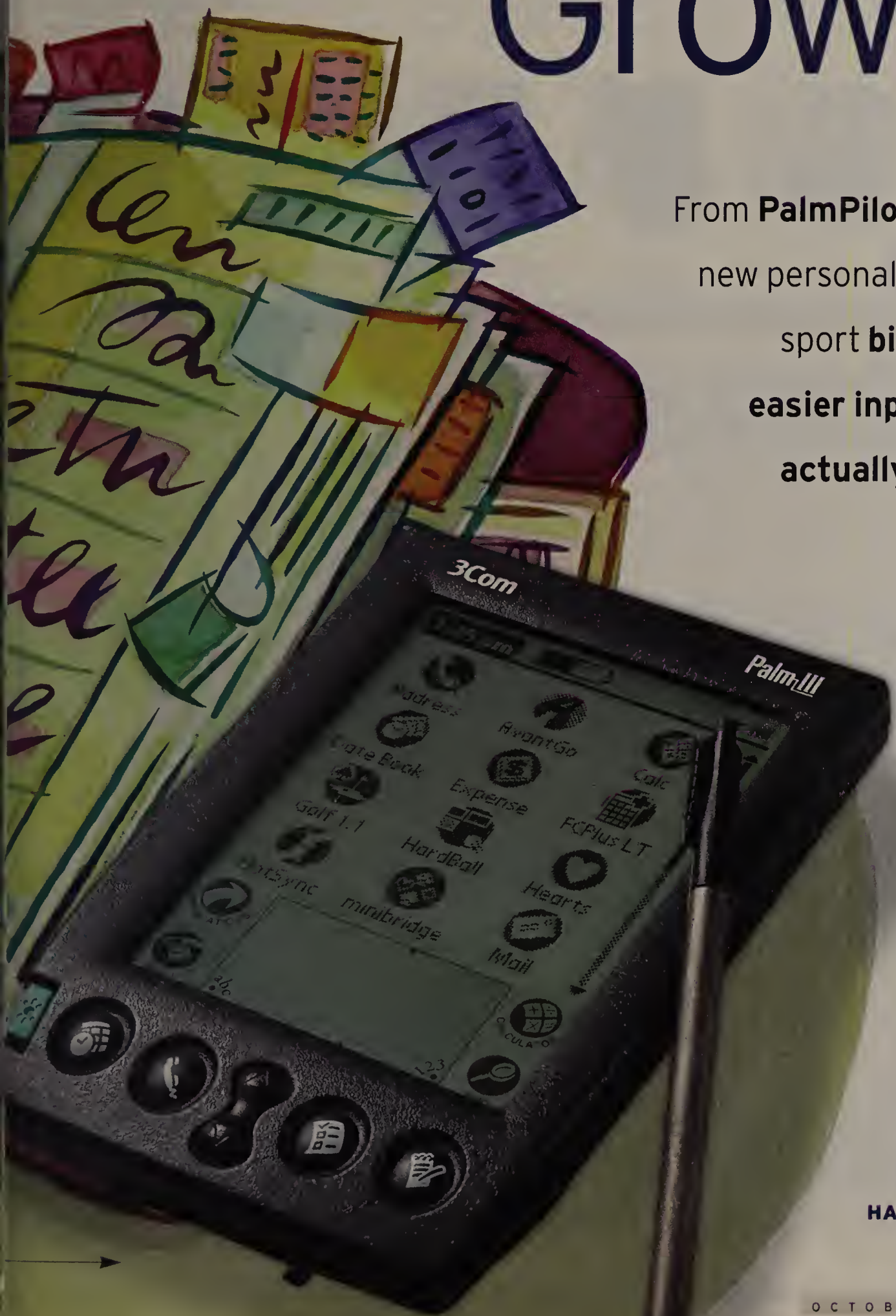
BELOW: The $799 NEC MobilePro 750C breaks the old handheld mold with its large, comfortable keyboard and bright color screen—making it one of the easiest PDAs to use.

BEST BUY WITHOUT KEYBOARD

RIGHT: Despite competition from several Windows CE devices, 3Com's $399 Palm III, with its fast operating system and stunning 30-plus hours of battery life, remains the top PDA in its class.

ILLUSTRATION BY BUD PEEN; PHOTOGRAPHS BY KEN SMITH

Palmtop PCs Grow Up



From **PalmPilots** to **MobilePros**, new personal **digital** assistants sport **bigger screens** and **easier input**. Wow, you may **actually** want to **use** one.

146 154 158

Palmtop Users Speak Up

150

Wanted: Seamless PDA Syncing

156

Going Online? Good Luck!

158

Input Race: PDAs vs. a Desktop

BY MICHAEL S. LASKY, HARRY McCRACKEN, AND VINCE BIELSKI

FOR A DECADE,

palmtop PCs have been derided as toys for gadget heads. And why not? These very small computers (also called personal digital assistants, or PDAs) have struggled to break into the mainstream, but their notorious flaws—tiny screens, unusable keyboards, and poor handwriting recognition—have led to their ignoble end as drawerware. So much so that folks are still surprised to see one. In the small wooded town of Bothell, Washington, residents stare in disbelief when Microsoft engineer David Wecker takes his two Afghan hounds on a brisk stroll—and checks his e-mail at the same time. While his eager dogs tug the leashes he grips in one hand, Wecker reads and deletes messages on a palm-size PDA he holds in the other. His neighbors think he's nuts.

On the other coast in Boston, Harry McCracken, one of the authors of this story, draws similar stares from onlookers. As he rides the subway each day, McCracken types furiously into his handheld PDA, which

The New Wave of PDAs Large and Small

	3Com Palm III	Casio Cassiopeia E-10	Everex Freestyle Manager A-15	Sharp SE-300 Mobile Organizer	Compaq C-Series Model 810
	PDAs WITHOUT KEYBOARDS				
Overall score	B+	B	B-	C+	B-
In short	This model has all the marks of a winner: sleek, simple to use, fast, and very long battery life.	Doesn't match the Palm III's speed and battery life, but character recognition is slightly better.	Like the Casio, it's sluggish, complex, and has poor battery life; hard-to-use poorly designed buttons on side.	Least expensive PDA has no character recognition and small screen. You should avoid it.	Business software and extra security highlight this otherwise unexceptional monochrome unit.
Hardware [1]	Slightly larger than cassette tape. 2MB of RAM, expandable with CompactFlash card. Great 30-hour-plus battery life. A-	A tad larger than Palm III. 4MB of RAM expandable with CompactFlash card, 3 navigation buttons. Poor 5- to 10-hour battery life. B	About size of Palm III. 8MB of RAM expandable with CompactFlash card. Tiny side buttons. Batteries last only 5 to 10 hours. B	Smallest of bunch. Lack of hardware buttons slows navigation. 1MB of RAM can't expand. Great 20-hour-plus battery life. B	Size of a paperback. 8MB of RAM, one PC Card slot. Proprietary memory modules and PC Card memory. B- to 10-hour battery life. B
Operating system and extra software [2]	PalmOS 3.0 is fast and efficient. Skimpy package includes a financial calculator, world clock, Web viewer for offline use, more. B+	Windows CE 2.0 is sluggish, complex. Better-than-average package for faxing, viewing photo files, Quicken Expensable, more. B-	Windows CE 2.0 is same as on Casio. Okay bundle: fax, Quicken Expensable, CalliGraphy Lite 5.1. Syncs with Outlook and Schedule+. C+	Proprietary OS is quick and easy. Average bundle: IntelliSync syncs with key PIMs, and ClipManager downloads reports. A-	Windows CE 2.0 is improved but still cumbersome. Good software assortment: remote control, corporate e-mail access, and more. B
Input	Stylus input is slow with tiny on-screen keyboard or Graffiti character recognition. Graffiti requires precision. B+	Hard to write long memos on tiny on-screen keyboard or with Jot character recognition. Jot's a little easier than Graffiti. A-	Same as Casio's. Okay for short notes. Jot allows you to input real letters, and it rarely misinterprets what you are writing. A-	Lack of character recognition is a big drawback. You have to use tiny on-screen keyboard. Also records user's own handwriting. C-	Its flat, circle-shaped keys are just barely adequate for light data entry. The twiglike stylus is difficult to use. C
Communications	$129 modem optional. E-mail just bearable. No attachments. Third-party software needed for very limited Web browsing. B-	$129 modem optional. AC adapter recommended to power modem. E-mail just bearable. No attachments. No Web browsing. C	Same limitations as Casio, but takes attachments. If you need a PDA for e-mail and light Web work, choose a keyboard-based device. C	No modem option is available. The Sharp can read e-mail messages and some Web pages downloaded from a PC. C-	Has a built-in 33.6-kbps modem. Works well for e-mail and handles attachments, but Web browsing is very slow. B-
Screen and sound	The Palm III's monochrome screen features easy-to-read large fonts and backlighting. Does not offer voice recording. B	Four-shades-of-gray screen. Backlighting. Dark fonts very readable. Low, raspy sound. Power-hungry voice recorder. B+	Four-shades-of-gray screen isn't crisp. Fonts harder to read than Casio's. Backlighting. Poor voice recorder. B-	A dozen navigation buttons take up too much screen. Wispy fonts are hard to read. Backlighting. No voice recording. C	Compaq's bright backlighting helps the unit's otherwise dim 6.5-inch monochrome display. Adequate sound. C+
Price and contact information	$399; 800/881-7256; www.palm.com INFONET NO. 756	$399; 800/836-8580; www.casio.com INFONET NO. 757	$399; 888/725-6724; www.freestyle.everex.com INFONET NO. 758	$180; 800/237-4277; www.sharp-usa.com INFONET NO. 759	$599; 800/652-6672; www.compaq.com/products/handhelds INFONET NO. 764

Best Buy

[1] All units have an infrared port and a port for serial connection to a PC. Battery testing was informal.

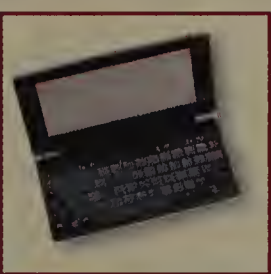
[2] All Windows CE machines have word processor, spreadsheet, personal information manager, Web browser, e-mail, presentation player, and fax software; Psion has all of these except a presentation player.

is no bigger than a thick checkbook. Passengers wonder how he does it.

But soon, they may consider using a PDA themselves. With the release of the latest models, PDAs are finally leaving the province of geeks. Even the average consumer may have reason to give them a second look.

We tested ten PDAs, ranging in price from $180 to $899, and found some improvements that could change your mind about purchasing one of these devices. If you want a wide range of applications on your PDA, prefer keyboard input over a stylus, and don't mind carrying a device with dimensions somewhere between those of a thick checkbook and a hardback book, you should consider a handheld model. In PDAs of this class (which generally measure about 7 by 5 by 1.5 inches and weigh 1 to 2 pounds), larger, more usable keyboards and color screens are the big news this year. After some practice, we were able to touch-type—a first—on our Best Buy handheld, NEC's $799 MobilePro 750C, an almost-10-inch-wide Windows CE 2.0 unit. Like other handhelds, the MobilePro also comes with an internal modem and word processing, spreadsheet, and personal information management applications. It's also suitable for doing light Web browsing on the road. (See "PDAs Online: A Web of Restrictions," page 156.)

As for most of the other handhelds here, we'd advise avoiding them if you're buying mainly for the keyboard. Among those with color screens, only the LG Electronics Phenom Ultra could match the MobilePro for ease of typing. The Compaq C-Series Model 810 and Philips Velo 500 cost hundreds of dollars less, but you won't be happy with their hunt-and-peck keyboards. The HP 620-LX has a more bearable keyboard. Among the compact handhelds, the Psion Series 5 offers the best keyboard for typing input. Its keyboard is a smaller version of the NEC's (see "Input Speed Test: PDAs Versus a Desktop PC," page 158).

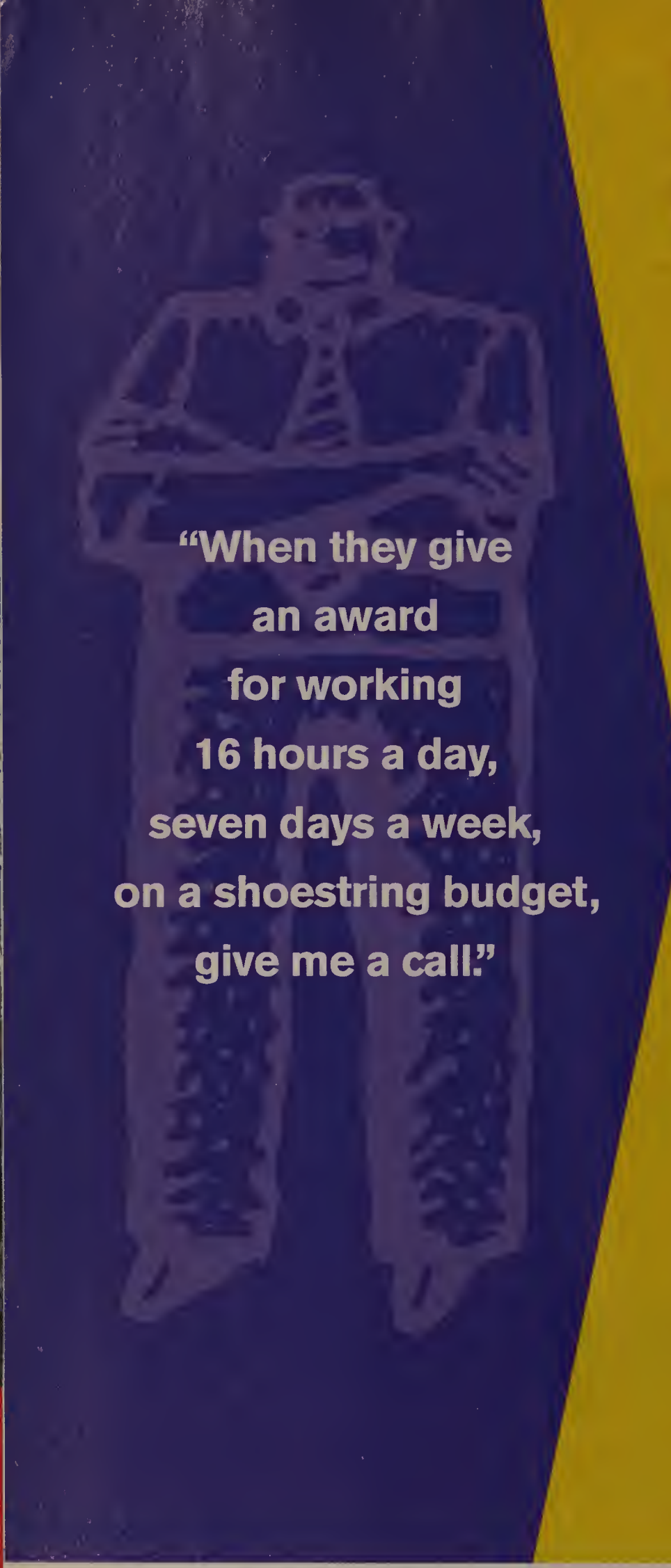


Hewlett-Packard 620LX	LG Electronics Phenom Ultra	NEC MobilePro 750C	Philips Velo 500	Psion Series 5
PDAs WITH KEYBOARDS				
B	B+	A-	B-	B
Fine color screen, decent keyboard, and good expandability. Poor battery life is its downfall.	A close second to similar MobilePro, with slightly better keyboard. But NEC has better software bundle.	Great featherweight alternative to a notebook. The only drawback: It's the bulkiest device here.	Good value among monochrome units, but miniature cards used for expansion are expensive.	Monochrome unit is a strong Windows CE alternative with a great keyboard for a small device.
Size of a paperback novel. 16MB of RAM, one CompactFlash slot, one PC Card slot. Has poor 2- to 4-hour battery life. B	Size of a long hardback book. 16MB of RAM, one CompactFlash slot, one PC Card slot. Has 5 to 8 hours of battery life. A-	The size of the Phenom Ultra. 16MB of RAM, one CompactFlash slot, one PC Card slot. Offers 7 to 9 hours of battery life. A-	Size of a thick checkbook. 16MB of RAM, two Miniature Card slots. Includes rechargeable battery. Has 8- to 10-hour battery life. B	Size of Philips Velo 500. 8MB of RAM, one CompactFlash slot. Unit turns on when opened. Has 10- to 12-hour battery life. B+
Windows CE 2.0 is same as the Compaq. Adds handy month-at-a-glance view to calendar, plus expense reporter, and more. B	Windows CE 2.0 is more usable here than on smaller-screen devices. Skimpy bundle includes personal finance package. B-	Windows CE 2.0 is same as on Phenom Ultra. Generous collection of bonus software: handwriting recognition, and more. B+	Windows CE 2.0 is improved but still cumbersome. Software includes database, corporate e-mail access, and other useful tools. B	Elegant, fast alternative to CE uses screen efficiently. Includes database, paint programs; file management is cumbersome. B+
The unit's wide keyboard and big keys make typing bearable, if not pleasant. Its tapered stylus has a solid feel. B	Spacious keyboard makes touch-typing possible. Larger stylus is a plus. Keyboard has two user-programmable keys. A	Keyboard is like Phenom's. Undersize backspace key too close to power button. Only keyboard unit with character recognition. A	M&M-size keys are okay for short periods, but a pain for extended typing. The small stylus is difficult to grip comfortably. C+	Only small PDA on market with notebook-style keyboard. Typing is surprisingly fluent, and long, sculpted pen is easy to hold. B+
No built-in modem, but one can be added via PC Card slot. Includes adequate Web browser and good e-mail with attachments. C+	Has a built-in 33.6-kbps modem. Works well for e-mail, and attachments are okay. Better than most for Web browsing. B+	Includes a built-in 33.6-kbps modem. The MobilePro's communications features are similar to the Phenom Ultra's. B+	Built-in 28.8-kbps modem. Works well for e-mail and handles attachments. Web browsing a bit faster than other units. B	$129 optional 14.4-kbps modem or $139 PC Card adapter. Decent Web browser and e-mail, but no file attachments.[3] C
Features a fine 6.5-inch color screen. Audio is decent, but the external recording button is difficult to locate. B+	The large 8.1-inch color display is among the best found on a PDA. Phenom Ultra's sound is slightly fuzzy, though. A-	The MobilePro's 8.1-inch color screen equals the Phenom Ultra's. Offers two backlight levels. Has good audio quality. A	Backlighting improves the Velo's otherwise murky monochrome screen. Offers high-capacity audio recording. C+	Psion has an average 5.8-inch monochrome screen. Backlighting is okay. Audio is among the loudest we tested. C+
$799; 800/443-1254; www.hp.com/handheld INFONET NO. 762	$899; 800/243-0000; www.lgphenom.com INFONET NO. 761	$799; 888/863-2669; www.necnow.com INFONET NO. 760	$599; 888/367-8356; www.velo.phllips.com INFONET NO.765	$499; 800/997-7466; www.psion.com INFONET NO. 763

[3] Vendor says unit will handle attachments by the time you read this.

PALM III: A BREEZE TO USE

IF YOU'D rather relinquish a keyboard in favor of a simpler, less expensive PDA that can fit into your pocket, then a palm-size PDA is for you. These monochrome-screen devices go through fewer batteries than handhelds. On the downside, inputting data into these tape cassette–size PDAs can be a more painstaking task, since these devices have smaller displays and rely on character recognition or diminutive ▶



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Would Nicole Diller Buy a PDA? No

THE TEST

To help Nicole Diller, a litigation attorney in San Francisco, California, answer that question, we gave her a 3Com Palm III, a screen-input PDA. We told her she had to use it in place of her paper planner for one month.

WHAT SHE LIKED MOST

Having all her to-dos on hand

WHAT SHE LIKED LEAST

Took too long to input information

HER EXPLANATION

With my busy schedule as a litigation attorney, I could definitely use more order. Particularly when I leave the office to meet a client or go to court, I often find myself needing a number but not having it with me. So I wind up phoning my secretary and having her flip through my Rolodex or search my PC's contact manager. Suddenly, with the Palm III (I put all my necessary contacts into it), I had instant access to all my numbers.

My favorite feature turned out to be the to-do list. My former "organizational tool" consisted of leaving myself voice-mail messages or writing notes on the back of a bill. With the PDA, I enter everything I need to remember and then sync it to my desktop PC. This feature was surprisingly easy to use.

I found myself becoming addicted. Once when leaving for a short vacation, I became paranoid about leaving my security blanket (a.k.a. my Palm III) at home. But I came to my senses. Who really needs a computer in the middle of the Death Valley desert? The point is, with a PDA in hand, I felt like I had my act together: I knew I wouldn't miss an appointment, and I always had my address book and grocery list at the ready.

Then problems began to emerge, starting with the calendar. Since the calendar was so small, it was easy to input information on the wrong day. And entering data via the tiny on-screen keyboard takes ten times longer than on a regular computer. Finally, even if you learn the Graffiti program, you can't write in cursive: You have to print, which is laborious for me. Ultimately, too much is sacrificed for size.

My verdict? The Palm III was really helpful, and a kick to use—but not indispensable. It's more convenient than leaving myself voice-mail messages, but not $399 more convenient. I'd rather spend the money on a vacation—but not in Death Valley again.

on-screen keyboards. The $399 3Com Palm III, the successor to last year's popular PalmPilot, is our favorite in this category. Despite Microsoft's big push to compete with the Palm III by arming vendors with the Windows CE 2.0 operating system for PDAs, the Palm wins out with its simpler, faster operation.

The smallest PDA of them all is the Rex, a credit-card-size device with a calendar, contact list, and to-do list. Input is its big drawback: Syncing the Rex with your PC is your only option for now. The next version, the Rex Pro, is expected to ship soon but wasn't ready in time for us to review.

WINDOWS ON PDAs

IT'S A FAMILIAR scenario by now: A breakthrough product catches Microsoft's eye—and before you know it, the software giant is swamping the smaller company by making its own version of the program and using its market presence to help sell more of it. In the case of PDAs, last year's PalmPilot (with sales of 1 million units it's considered a wild success by PDA standards) undoubtedly spurred Microsoft to get more serious about this market.

In addition to wheeling deals with numerous PDA hardware manufacturers to install its CE operating system on their machines, Microsoft is using its dominance in the desktop and notebook arenas to convert consumers. Its marketers have been pushing Windows CE devices as "PC companions" and offered a certificate for a free copy of Windows 98 to people who bought a palm-size device by mid-1998. Seven of the ten new PDAs in this roundup use CE 2.0. So is buying a Windows CE PDA a no-brainer? Not yet.

In our tests, we looked at each PDA's operating system, plus hardware design, battery life, input, e-mail, Internet access, screen, sound, price, and PC connectivity (see "How to Avoid That Syncing Feeling," page 150). We came away liking many things about Windows CE 2.0. If you already use Windows on your PC, you'll recognize the Start button, desktop icons, and toolbar. Ultimately, however, we found Windows CE a bit more cumbersome and frustrating to use than the proprietary PDA operating systems that come on the Palm III, Sharp SE-300 Mobile Organizer, and Psion Series 5.

With ten flavors of Windows CE devices shipping only 430,000 units in 1997, a Microsoft takeover of the PDA operating system market won't happen anytime ▶

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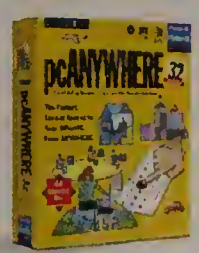

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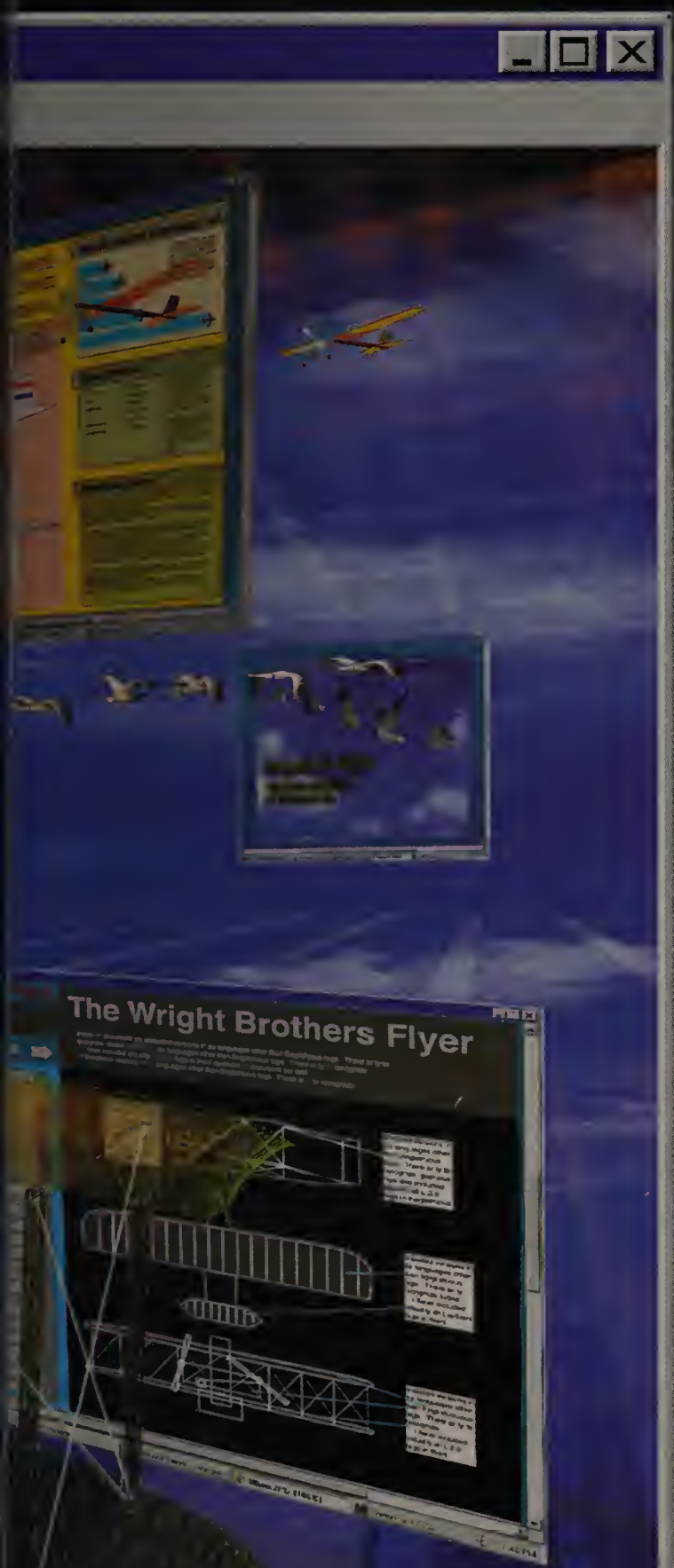

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soon. But the new and improved PDAs, as a class, have finally achieved some staying power. "The PalmPilot played the largest role in [making PDAs more popular], but Windows CE helped legitimize the market as well," observes Mike McGuire, a senior analyst for Dataquest. "We now have a firmly established handheld space [in the PC market], and people are starting to create some interesting applications," he adds.

Such apps include consumer-oriented programs to track gas mileage and the like. For now, Windows CE machines come with stripped-down versions of a word processor, spreadsheet, personal information manager, e-mail, Web browser, fax software, and a presentation player. Except for the last item, the Psion (a Windows CE alternative) also has all of these.

EASE OF INPUT

WINDOWS CE 2.0–equipped PDAs generally offer easier input than the proprietary systems do. For instance, CE 2.0 devices without keyboards have slightly better character-recognition software than the Palm III. Jot, the software bundled with the Casio Cassiopeia E-10 and the Everex Freestyle Manager A-15, rarely misinterpreted our pen strokes and made writing with a stylus almost as easy (though not nearly as fast) as writing on paper. In contrast, the ▶

How to Avoid That Syncing Feeling

NO MATTER HOW MUCH you love your PDA, your ardor will cool quickly if you can't easily transfer your information to and from your PC. Not all PDAs sync with all personal information managers, however.

For example, until recently Windows CE 2.0 devices couldn't be synchronized with ACT 4.0 (which has been available since early spring). You may also encounter problems stemming from disparate data fields in your PDA and desktop PC software. Windows CE devices, for instance, mimic Microsoft Outlook in setting aside a special field for events or appointments on your calendar. Because Lotus Organizer has no such field, the location information in a Windows CE PDA will not sync with this PIM. So make sure a PDA supports your PIM—with or without the help of additional software—before you buy it, and be prepared to devote some time and energy to setting everything up.

Syncing Windows CE devices over a serial cable, we ran into an annoying bug on PCs that use dial-up networking to connect to the Internet: When we tried to initiate synchronization, the Windows CE desktop app ignored the direct cable hookup and tried to establish a dial-up connection to the Internet. You can disable automatic Internet connection in your browser, but that can be inconvenient.

THIRD-PARTY HELP

OUT OF THE BOX, 3Com's Palm III can sync only with its bundled desktop software. But vendors are picking up the sync slack. The best package is Puma's IntelliSync ($70, www.pumatech.com). Not only does it cover most major PIMs (for Lotus Notes, you must also install Notes-enabled versions of Lotus Organizer—Organizer GS and 4.1 Premium Edition), but it lets you synchronize different types of data with different programs: You could get your contacts from ACT and your calendar from Lotus Organizer. Palm devices don't sync without prompting, however; you must push the HotSync button on the cradle or tap the HotSync icon on the connected device.

If you work in a Microsoft-centric environment, you won't have to spend a cent to synchronize a Windows CE 2.0 device because they were built to work with Microsoft Outlook or Schedule+ (in addition to Word, Excel, and PowerPoint). But because Windows CE is still a relatively new platform, third-party software for synchronizing with non-Microsoft products is only now hitting the market. For instance, the first version of Puma's IntelliSync for Windows CE did not work with ACT 4.0 or Lotus Notes; if you use these applications, look for the Puma upgrade (version 2.03) that supports these popular packages.

CASSIOPEIA in its cradle: Beware of battery drain.

To sync a Windows CE PDA, you don't have to lift a finger: Set the device in its cradle, and changes are automatically entered to either the PDA or your computer, or to both. But there's a downside: Your PDA remains on after the transfer, and if you forget to remove it from the cradle, its batteries will quickly drain. An AC adapter—optional with some PDAs and standard with others—eliminates this problem.

SYNCABLE PSION

THE PSION SERIES 5 doesn't track changes automatically, but you can set it to sync at specified intervals. The Series 5 offers the widest range of out-of-the-box synchronization choices. It works with Lotus Organizer (2.1, 97 or GS, and 4.1, but not the Notes-enabled version); Outlook 97 or Schedule+ 7, 7a, or 7.5; or Psion's own desktop software. You can also import documents from major office suites (Microsoft Word and Excel 97; Lotus Ami Pro 3.1 or 3.0 and Lotus 1-2-3 WK1-WK3; WordPerfect 8.0 and earlier; and Quattro Pro 8.0 and earlier). Lotus Notes synchronization software should be ready by the time you read this; a preproduction version that we saw worked beautifully in our tests. But if Psion doesn't support your PIM, you're out of luck: No third-party synchronization software exists for Psion's proprietary Epoc 32 operating system.

—Yardena Arar

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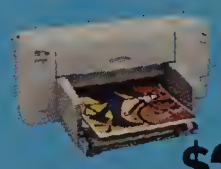

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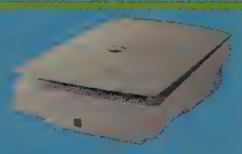

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Would Liz Stevens Buy a PDA? Yes

THE TEST

To help Liz Stevens, a real estate manager and broker in Berkeley, California, answer that question, we gave her a handheld HP 360LX monochrome PDA with a keyboard. We told her she had to use it in place of her paper planner for one month.

WHAT SHE LIKED MOST

It helped organize her hectic life

WHAT SHE LIKED LEAST

Hard to read the monochrome screen

HER EXPLANATION

I'm not the most organized person in the world. How could I be? Not only do I manage a staff of 45, but I'm out all day selling properties, running from one appointment to another. It doesn't help that I've been relying on a bulky Day-Timer and multiple Post-it notes to myself. Not the height of efficiency.

I'd been thinking of buying a PDA. I loved the idea of having electronic input so I could edit entries without crossing things out. What's more, I could have everything in one compact place. No doubt about it: I was a prime guinea pig for this experiment.

Within a few days, my PDA proved to be a lifesaver. I was driving to an appointment and needed to call my client to tell her to bring a document. So I just checked my PDA (after pulling over first, of course!). In the past, I might have found myself in a bind without the client's number, since my address book doesn't hold each and every contact name. But now that I sync my information from my PC to my PDA, I have all the numbers I need.

What a great feeling to have all my datebook and phonebook information together in a small, transportable computer. Next, I plan to get a wireless modem so I can fax things to people right from my handheld, without waiting to get back to the office.

I do have some gripes. I don't like the small keyboard, but I guess that's the price I have to pay for the sweet size of this device. Another annoyance: When I send the addresses from my computer to my PDA, they drop out of alphabetical order, so I have to do a "Find" or scroll down. This is frustratingly slow, especially since I have an enormous database of names and addresses. And I wish I had gotten a device with color and a bigger screen; the monochrome one is hard to read.

Overall, I can't imagine life without this little devil. I'm far more organized because of it. Would I spend $541 for one of these PDAs? In a heartbeat.

Palm III's Graffiti is somewhat more exacting. Slight variations in pen strokes can produce different letters, and some punctuation marks (such as commas) are difficult to make. The Palm III, though, is the only device that keeps the writing panel on screen at all times, so you don't have to reopen it every time you want to jot something down. The stripped-down Sharp SE-300 Mobile Organizer doesn't come with any character-recognition software, an omission that forces you to grapple with a tiny on-screen keyboard as your main input device.

The latest big keyboards and screens are available only on Windows CE 2.0 handhelds. We were impressed with the nearly-10-inch-wide keyboards on the MobilePro 750C and Phenom Ultra. Both mimic the feel of standard notebook keyboards—after a little practice, a touch typist can reach high speeds on them.

But when it comes to general navigation, non-CE PDAs are easier to use. For one thing, their simpler proprietary operating systems, built from the ground up for a small computer, make them faster. If you find the Windows hourglass annoying on your desktop PC, you'll hate waiting for it on a PDA. Although the hourglass disappears in a second or two, the screen transitions on non–Windows CE PDAs occur nearly instantaneously. Some operations on a Windows CE 2.0 PDA are needlessly complex, too. Certain tasks, such as adding a new contact or bringing up the calculator, take several more steps on the Casio Cassiopeia E-10 and the Everex Freestyle Manager A-15 than on the Palm III or the Sharp SE-300.

SEEING IS BELIEVING

PDAS, ESPECIALLY HANDHELDS, are gradually converting to color screens. Available on half of the keyboard-equipped PDAs we reviewed, these ▶

PHOTOGRAPH: ROBERT HOUSER

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great-looking, bright dual-scan screens approach notebook quality and represent a significant improvement over monochromes for reading small type. Nonetheless, our favorite display on a keyboardless PDA belongs to the monochrome Palm III—our Best Buy. Because of the device's permanent writing panel, the Palm III has less screen space than its Windows CE competitors, but its fonts are the largest and thus the easiest to read.

The monochrome Psion Series 5, the only non-CE handheld we tested, saves precious screen real estate by displaying the menu bar only when you touch the screen. With a single click, you can magnify the display for better viewing.

All PDAs give you a backlighting option, which makes for easier reading. (Backlighting also consumes a lot of battery power.) All have similar problems with glare, however: Sometimes you have to twist the device to see the screen better.

THE BATTERY LIFE GAP

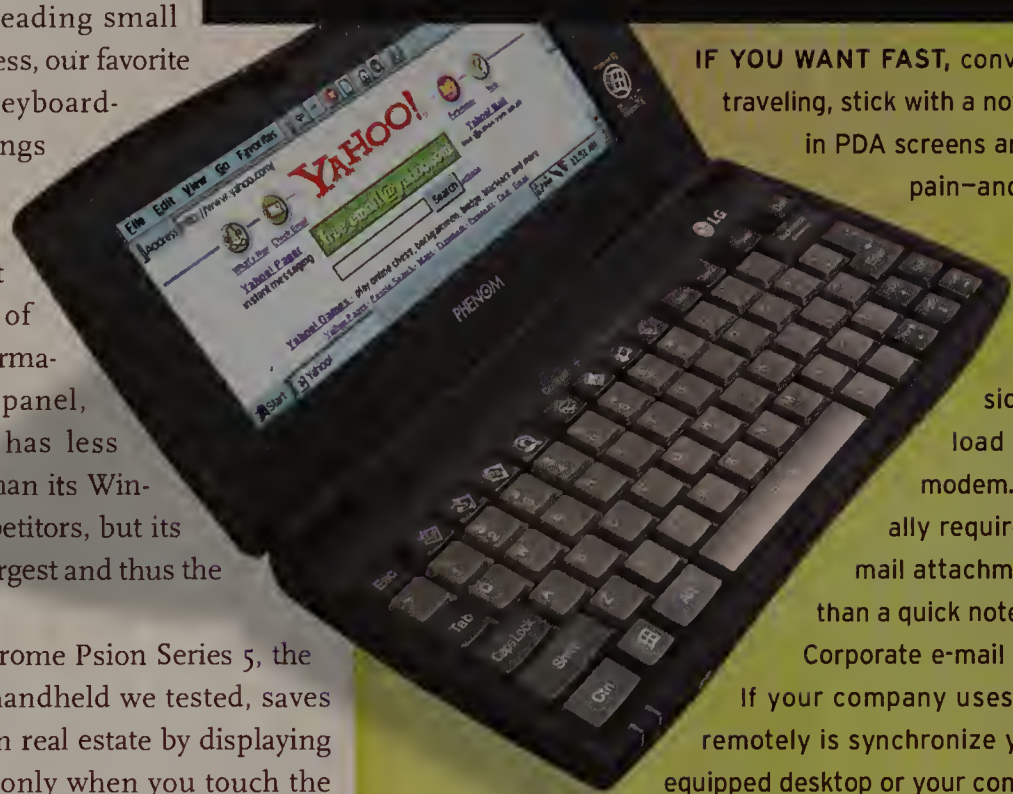
RAPIDLY DRAINING batteries can make even the best PDA a useless chunk of plastic that holds your phone numbers and addresses, so always remember to take along extra batteries, especially if you're using a Windows CE palmtop or color PDA. In our informal tests, the Palm III was the long-distance winner by a huge margin. It lasted for 30-plus hours, while the power-hungry CE palm-size devices pooped out after 5 to 10 hours—pretty dismal for a miniature PC designed to go on the road.

Among handhelds, monochrome PDAs had the best battery life. The Compaq and Philips averaged a respectable 8 to 10 hours and the Psion an even better 10 to 12 hours in our tests. The NEC and LG handhelds dealt with the huge energy consumption of their large color screens by using big lithium ion batteries. Still, these handhelds ran for between 5 and 9 hours in our tests. The color screen on the HP handheld, meanwhile, taxed that unit's tiny batteries severely, depleting them in only 2 to 4 hours.

PRICE MATTERS

DESPITE THE LATEST advances in PDAs, many likely users will probably hold off: Why spend hundreds of dollars on a PDA when a $20 paper scheduler works just fine? So we gave PDAs to three professionals to use for one month in place of their paper organizers. Then we asked each of them the same question: Would you buy one for yourself? (see their first-person responses on pages 146, 154, 158). One user answered with an enthusiastic yes, saying the PDA gave her chaotic life more order. But the two others said ▶

PDAs Online: A Web of Restrictions



LARGE PDAs, like the Phenom Ultra, handle Web text fine.

IF YOU WANT FAST, convenient access to the Internet while traveling, stick with a notebook. Despite continuing advances in PDA screens and software, e-mail on a palmtop is a pain—and live, unrestricted Web browsing is virtually impossible.

I tested the e-mail and Web capabilities of several PDAs. The units without keyboards, including the Casiopeia E-10 and the Palm III, can download and send e-mail if equipped with a modem. But the modems are bulky (and usually require AC adapters); you can't receive e-mail attachments; and composing anything more than a quick note is time-consuming.

Corporate e-mail systems complicate matters further. If your company uses Lotus Notes, the best you can do remotely is synchronize your mail, either from your modem-equipped desktop or your company's dial-up server.

Surfing the Web is either difficult or impossible. Windows CE 2.0 devices without keyboards let you download condensed versions of Web pages for offline viewing, but some pages don't adapt well to the format changes, and in any case you can't actually browse with this OS. In contrast, Palm IIIs with modems can receive primitive versions of pages via third-party software such as Smartcode Software's HandWeb (www.smartcodesoft.com). Palm IIIs can also browse selected pages downloaded from PCs.

THE BIGGER YOUR PDA, THE BETTER

DEVICES WITH KEYBOARDS do better, especially with e-mail. With a Windows CE device, you can enter your Internet account settings, make the connection, and send and receive e-mail using Microsoft's Pocket Outlook communications app—all within a minute or two. The mail download is somewhat slower than on a Windows 95 machine, and memory is limited, so you're best off downloading only headers or the first 100 lines of longer messages.

Windows CE 2.0 handhelds can accept attachments, but they can only view text files formatted in plain text (.txt) or rich text (.rtf), and graphics files formatted in .jpg, .bmp, .gif, and .html. Colleagues who frequently send you files can help out by using Office to Pocket Office, a free conversion utility available on Microsoft's Web site.

The relatively large and bright color screens on the most expensive Windows CE devices, such as the NEC MobilePro 750C, are best for Web browsing, but they're still far from ideal. Small pages that contain mostly text load fine, but when sites start adding frames or large graphics, you simply don't get everything.

—Y. A.

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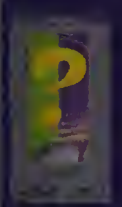

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PCWEEK BEST OF COMDEX

EDITOR'S CHOICE

Would Scott Kraft Buy a PDA? No

THE TEST

To help Scott Kraft, a purchasing manager in Warren, Michigan, answer that question, we gave him a Casio Cassiopeia E-10, a palm-size PDA without a keyboard. We told him he had to use it in place of his paper planner for one month.

WHAT HE LIKED MOST

It's much smaller than his paper organizer

WHAT HE LIKED LEAST

Trying to get contact information to sync perfectly

HIS EXPLANATION

I'm practically married to my Franklin Planner. It's a binder that has a contact organizer, a task list, a note holder, and a scheduler. So I knew converting to digital would be a real challenge. Still, I wanted to see whether a PDA could do a better job of keeping me organized.

I immediately liked the Cassiopeia's small size and light weight. Setting up the synchronization to transfer my appointments and contact information to my desktop PC was a cinch. I was off and running. Well, sort of.

On my main PC, Microsoft Outlook holds my extensive contact list. But I kept running into problems trying to sync the list with my Casio. Though contacts' last and first names transferred successfully, company names were often lost. Despite my efforts, I couldn't figure out how to transfer all the data to the Casio perfectly—a big problem.

My other big beef? Entering anything other than brief notes on the on-screen keyboard using the stylus was a clunky, time-consuming process. The Cassiopeia's charm really fizzled the day I tried to take notes in a fast-paced meeting with my boss. It was pretty embarrassing to sit there punching in letters in front of him, unable to keep up.

Would I ever spend $399 on a Cassiopeia? No way. It's an overpriced organizer that adds too many steps to my work routine. I have to turn it on and search to get to the right place. With my Franklin Planner, I open it up and boom, the information is right there.

no, partly because of the high cost of a PDA compared to a paper planner. For many potential converts, a PDA simply isn't worth the extra money.

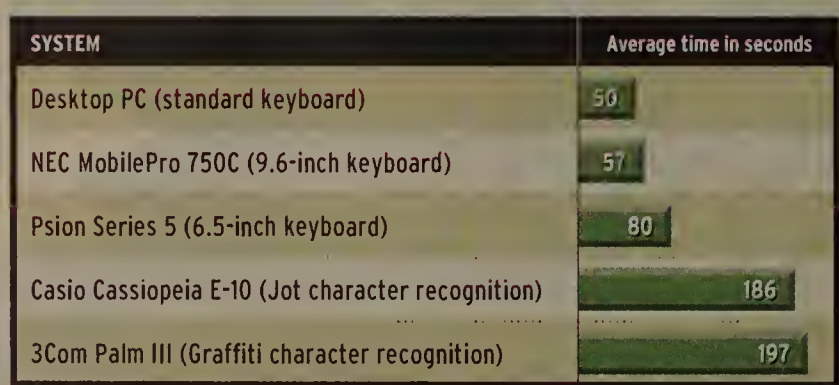
Down the road, Microsoft hopes to attract new users by adding functionality without hiking the price. "We're going for a richer experience. Basically, more for the same price," says Windows CE product manager Phil Holden. The company is reportedly preparing to release a new version of Windows CE, which is expected to spur production of more powerful PDAs.

3Com says it will move in the opposition direction. "We will keep our products simple and fast. We see opportunity below $299," explains Greg Shirai, a 3Com product marketing manager.

PDAs may become better and cheaper, but the process will take years. "I don't see much volume till the year 2001 or 2002," concludes McGuire of Dataquest.

Input Speed Test: PDAs Versus a Desktop PC

TO COMPARE INPUT speeds between a desktop PC and a variety of palmtops, we put several *PC World* editors—all veteran PDA users—to the test. The editors were timed as they input two quotes totaling 50 words. Conclusion: A few PDAs are catching up to PCs.



Michael S. Lasky and Vince Bielski are senior associate editors for PC World, and *Harry McCracken is a senior writer. Also contributing were Senior Associate Editor Yardena Arar and freelance writers Leslie Crawford and Mike Hogan.*

For more information about all products in this article, select InfoNet no. 910. ■

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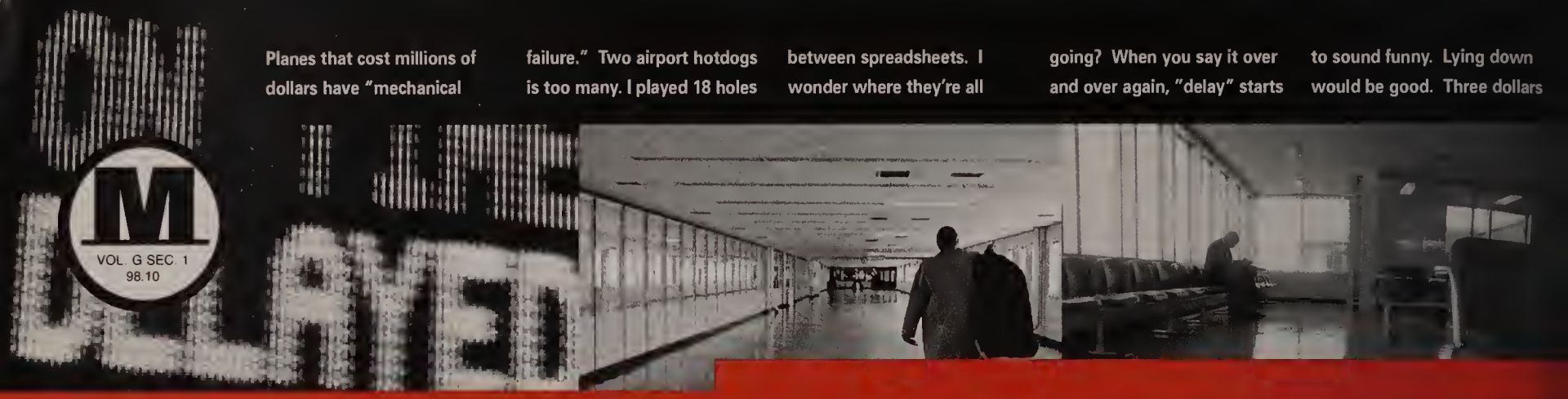

Planes that cost millions of dollars have "mechanical failure." Two airport hotdogs is too many. I played 18 holes between spreadsheets. I wonder where they're all going? When you say it over and over again, "delay" starts to sound funny. Lying down would be good. Three dollars

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***CNET* "EDITORS' CHOICE" BEST ULTRAPORTABLE REVIEWED, 5/98**

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You don't get to recharge your batteries every four hours. You don't get to rest whenever you feel like it. Why should your notebook? Life on the road is no cakewalk and your notebook should be designed to endure the rigors of mobile life as well as you do. Introducing the GoBook notebook. With a revolutionary modular battery design, lightning-fast performance featuring the fastest Intel® Pentium® II processors, and an incredibly thin and light package, it's the ultimate companion for those who stop at nothing to succeed. It's no wonder that *CNET* just awarded the GoBook Editors' Choice for best UltraPortable on the market, saying, "Micron's GoBook lessens the angst of life on the road."

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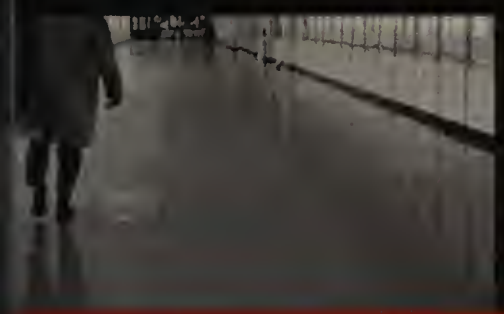
lot for water. Solitaire is actually my fun for about a minute. That person looks like somebody I know. I'm actually excited about the prospect of getting on a plane. Why isn't my cell phone working? That kid keeps staring at my GoBook. This is better than being in the office, I guess. What's that smell?



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"The GoBook outperformed every other machine in our review by a sizable margin" *CNET*, Editors' Choice, Best UltraPortable Reviewed, 5/98

Here's the GoBook difference: Featuring the fastest Intel Pentium II processors • Preloaded with Microsoft's Windows 98 • Includes a big active matrix 12.1" SVGA display powered by 128-bit graphics accelerator • A revolutionary modular battery design that performs as well traveling across town as it does across the Atlantic Ocean • Big room for expandability: The GoBook includes both a 24X CD-ROM drive and a 3.5" floppy drive • All in a super thin and light package that starts at just 1.35" thin and 4.4lbs.*

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Model Name	GoBook™ 266	GoBook² 233	GoBook² 266
Processor	Intel® Pentium® processor with MMX® technology 266MHz	Intel Pentium II processor 233MHz	Intel Pentium II processor 266MHz
RAM	32MB EDO RAM	64MB EDO RAM	64MB EDO RAM
Hard Drive	2.1GB hard drive	3.2GB hard drive	3.2GB hard drive
Monitor	12.1" SVGA display	12.1" SVGA display	12.1" SVGA display
CD-ROM	24X modular CD-ROM drive	24X modular CD-ROM drive	24X modular CD-ROM drive
Graphics	PCI bus with 128-bit graphics accelerator	PCI bus with 128-bit graphics accelerator	PCI bus with 128-bit graphics accelerator
Sound System	16-bit stereo/Wavetable sound	16-bit stereo/Wavetable sound	16-bit stereo/Wavetable sound
Cache	512KB L2 pipeline burst cache	512KB L2 pipeline burst cache	512KB L2 pipeline burst cache
Warranty	5-year/1-year Micron limited warranty	5-year/1-year Micron limited warranty	5-year/1-year Micron limited warranty
Software Included	Norton AntiVirus System Wizard Mobile Client†††† Microsoft® Windows® 98	Norton AntiVirus System Wizard Mobile Client†††† Microsoft Windows 98 Microsoft Office Small Business Edition	Norton AntiVirus System Wizard Mobile Client†††† Microsoft Windows 98 Microsoft Office Small Business Edition
Also Includes:	Bay battery 4.4lbs (w/floppy drive)* 6.7lbs (w/opt./base battery & floppy) USB, parallel, serial, VGA, PS/2, NTSC/S-Video ports MPEG compatible CardBus/Zoomed Video ready Microphone, stereo line-in/out jacks 2 Type II or 1 Type III PCMCIA slots 2-way infrared port Touchpad pointing device Modular floppy drive Add SuperBase Battery for $299	Bay battery 4.4lbs (w/floppy drive)* 6.7lbs (w/opt./base battery & floppy) USB, parallel, serial, VGA, PS/2, NTSC/S-Video ports MPEG compatible CardBus/Zoomed Video ready Microphone, stereo line-in/out jacks 2 Type II or 1 Type III PCMCIA slots 2-way infrared port Touchpad pointing device Modular floppy drive Add SuperBase Battery for $299	Bay battery 4.4lbs (w/floppy drive)* 6.7lbs (w/opt./base battery & floppy) USB, parallel, serial, VGA, PS/2, NTSC/S-Video ports MPEG compatible CardBus/Zoomed Video ready Microphone, stereo line-in/out jacks 2 Type II or 1 Type III PCMCIA slots 2-way infrared port Touchpad pointing device Modular floppy drive Add SuperBase Battery for $299
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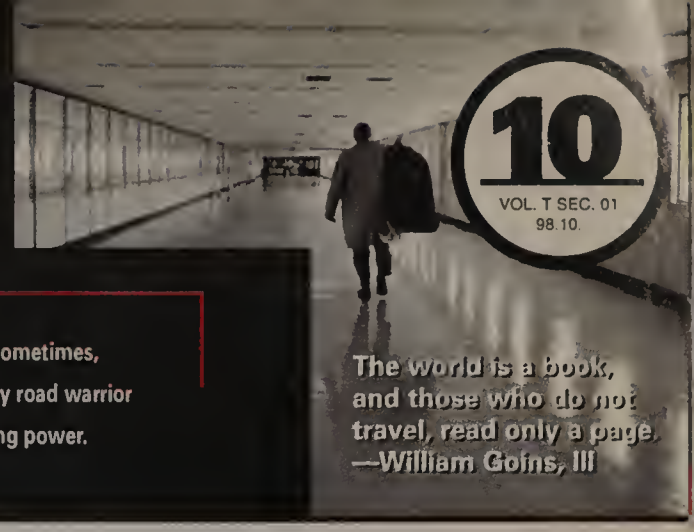

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—William Goins, III

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RAM	32MB SDRAM	64MB SDRAM	64MB SDRAM
Hard Drive	3.2GB hard disk drive (removable)	3.2GB hard disk drive (removable)	3.2GB hard disk drive (removable)
Monitor	12.1" SVGA TFT display	14.1" XGA TFT display	14.1" XGA TFT display
Extra Storage	3.5" floppy disk drive (dedicated bay)	3.5" floppy disk drive (dedicated bay)	3.5" floppy disk drive (dedicated bay)
DVD/CD-ROM	24X CD-ROM drive (dedicated bay)	24X CD-ROM drive (dedicated bay)	24X CD-ROM drive (dedicated bay)
Graphics	4MB video graphics accelerator	4MB video graphics accelerator	4MB video graphics accelerator
Sound System	Built-in stereo speakers & microphone	Built-in stereo speakers & microphone	Built-in stereo speakers & microphone
Cache	512KB L2 pipeline burst cache	512KB L2 pipeline burst cache	512KB L2 pipeline burst cache
Warranty	5-year/1-year Micron limited warranty	5-year/1-year Micron limited warranty	5-year/1-year Micron limited warranty
Software Included	Microsoft® Windows® 98 System Wizard Mobile Client™™ Norton AntiVirus	Microsoft Windows 98 Microsoft Office Small Business Edition System Wizard Mobile Client™™ Norton AntiVirus	Microsoft Windows 98 Microsoft Office Small Business Edition System Wizard Mobile Client™™ Norton AntiVirus
Also Includes:	Zoomed Video capable Li-Ion battery (dedicated bay) Microphone, stereo line-in/out jacks Touchpad pointing device CardBus ready S-Video & NTSC out; MPEG compatible Wavetable/3D Positional Sound 2-way fast infrared port	Zoomed Video capable Li-Ion battery (dedicated bay) Microphone, stereo line-in/out jacks Touchpad pointing device CardBus ready S-Video & NTSC out; MPEG compatible Wavetable/3D Positional Sound 2-way fast infrared port	Zoomed Video capable Li-Ion battery (dedicated bay) Microphone, stereo line-in/out jacks Touchpad pointing device CardBus ready S-Video & NTSC out; MPEG compatible Wavetable/3D Positional Sound 2-way fast infrared port
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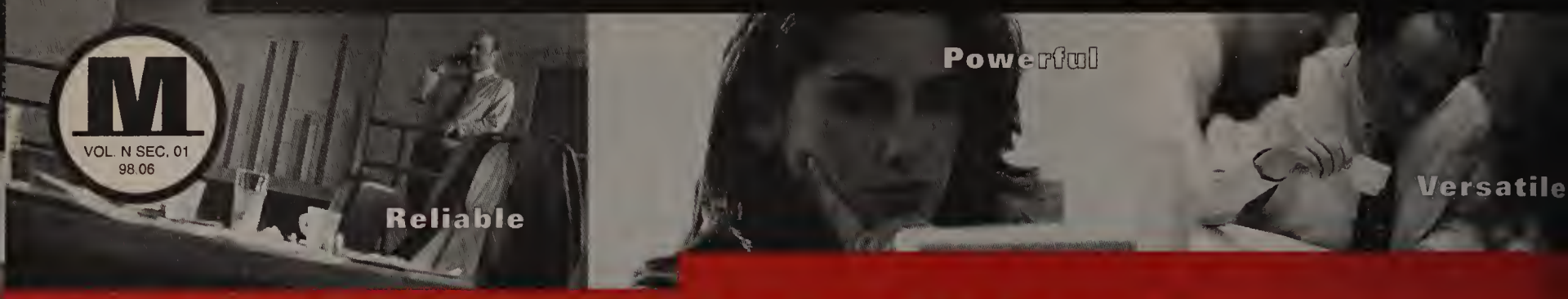

Intel Announces Pentium® II Xeon™ Processor.
Micron Announces Pentium II Xeon Processor-Based Serve
Micron Ships NetFRAME 6200 Server to Wide Acclaim
You Get One. Life Gets Great.

NetFRAME

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NetFRAME 6200	
Processor	Intel® Pentium® II Xeon™ processor 400MHz
RAM	128MB ECC EDO
Hard Drive	9GB U2W LVDS SCA 1" hard drive
Cache	Options for 512KB or 1MB L2 cache Xeon processor
CD-ROM	32X SCSI CD-ROM drive
Warranty	5-year/3-year Micron Power℠ limited warranty
Software Included	Intel LANDesk® Server Manager 6.0 Microsoft® Windows NT® Server 4.0 (10-user license)

Also Includes:
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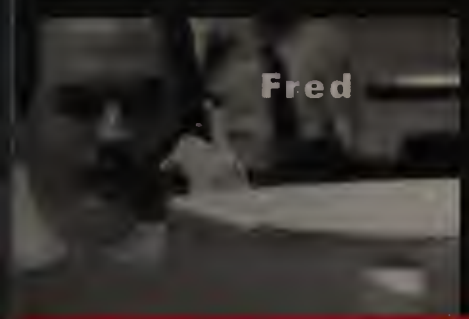
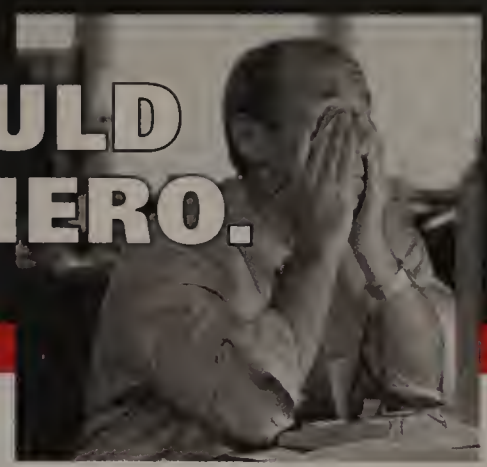
to scratch the surface. Let's face it, when you're crawling around under someone's desk in a jungle of twisted cables because they want to see the dancing baby and you're the y one in the office that understands that "hot-swappable hard-drives" aren't something dirty, the last thing you need is a server that's anything but flawless.



THEY SHOULD CALL ME HERO.



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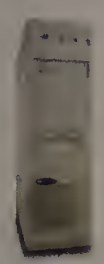
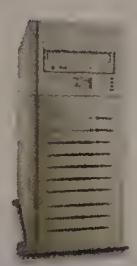
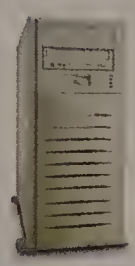
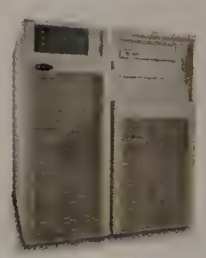

Model Name	NetFRAME LV2001	NetFRAME 3101	NetFRAME 3100	NetFRAME MV5000
Processor	Intel Pentium II processor 333MHz	Intel Pentium II processor 350MHz	Intel Pentium II processor 35DMHz	Intel Pentium II processor 333MHz
RAM	64MB ECC SORAM	64MB ECC 10DMHz SDRAM	64MB ECC 10DMHz 5DRAM	64MB ECC 5DRAM
Hard Drive	4GB Ultra Wide SCSI-3 hard drive	4GB Ultra Wide 5CSI-3 hard drive	4GB Ultra Wide 5CSI-3 hard drive	4GB Ultra Wide SCSI-3 hard drive
Cache	512KB integrated L2 ECC cache	512KB integrated L2 ECC cache	512KB integrated L2 ECC cache	512KB integrated L2 ECC cache
CD-ROM	32X EIDE CD-ROM drive	32X EIDE CD-ROM drive	32X EIDE CD-ROM drive	32X EIDE CD-ROM drive
Warranty	5-year/3-year Micron Power limited warranty	5-year/3-year Micron Power limited warranty	5-year/3-year Micron Power limited warranty	5-year/3-year Micron Power limited warranty
Software Included	Intel LANDesk Server Manager 2.B	Intel LANDesk 5erver Manager	Intel LANDesk Server Manager Microsoft Windows NT Server 4.D (10-user license)	Intel LANDesk 5erver Manager 2.B Microsoft Windows NT 5erver 4.D (1D-user license)
Also Includes:	Single or dual Intel Pentium II processors ECC SORAM option (4 OIMM slots) 5 expansion slots: 4PCI, 1 shared ISA/PCI Integrated Adaptec PCI Ultra Wide SCSI-3 controller Upgradable to 36GB storage Intel EtherExpress Pro 100 network adapter Dedicated server technical support, 7x24 1-year next-business-day on-site service†††	Single or dual Intel Pentium II processors 100MHz front side Bus Intel 440BX PCI chip set 3.5" floppy drive Integrated Symbios PCI Ultra Wide SCSI-3 dual channel controller 5 expansion slots: 3 PCI, 1 ISA 1 shared PCI/ISA B drive bays: 1 external 3.5", 2 external 5.25" 5 hot-swap 1.0" hard drive bays Integrated SVGA graphics (2MB) Integrated Intel 10/100 Ethernet 104-key Enhanced PS/2 keyboard Microsoft mouse with Mouse Manager Oedicated server technical support, 7x24 1-year next-business-day on-site service†††	NOS support (3 first-year incident resolutions), 7x24 Single or dual Intel Pentium II processors Intel 440BX PCI chip set 100MHz front side Bus 3.5" floppy drive Integrated Symbios PCI Ultra Wide 5CSI-3 dual channel controller 5 expansion slots: 3 PCI, 1 ISA 1 shared PCI/I5A B drive bays: 1 external 3.5", 2 external 5.25" 5 hot-swap 1.0" hard drive bays Integrated SVGA graphics (2MB) Integrated Intel 10/100 Ethernet 104-key Enhanced PS/2 keyboard Microsoft mouse with Mouse Manager Oedicated server technical support, 7x24 1-year next-business-day on-site service†††	NOS support (3 first-year incident resolutions), 7x24 Single or dual Intel Pentium II processors Memory: ECC, EDO or SDRAM option 9 expansion slots: 6 PCI, 2 ISA, 1 shared ISA/PCI 2 integrated Symbios Ultra Wide SCSI-3 controllers 1 integrated Symbios narrow SCSI controller Intel EtherExpress Pro 100 network adapter Embedded RAIO upgrade option I_2O-ready via embedded Intel i960-RO 5 internal, hot-pluggable, hard drive array bays (upgradable to 10) 1 360-watt hot-pluggable power supply standard (upgradable to 3 for added redundancy) Rack adapter option Dedicated server technical support, 7x24 1-year next-business-day on-site service†††
Price	$1899 $66mo. TechRefresh Lease	$2499 $87mo. TechRefresh Lease	$3699 $120mo. TechRefresh Lease	$4399 $142mo. TechRefresh Lease

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Maximum Resolution	1600*1200	1600*1200	1600*1200	1280*1204	1280*1204
Recommended Resolution	1280*1024@90Hz	1280*1024@90Hz	1280*1024@82Hz	1024*768@88Hz	1024*768@88Hz
Features	TCO 92, Super Hi-Contraast	TCO 92, Super Hi-Contraast	TCO 92, DecaClear®	MPR II, OSD Ctrl	MPR II, OSD Ctrl
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Where the Buys Are

The Best and Worst Mail-Order and Web Vendors

Want a great deal on software, peripherals, and supplies? You better shop around.

BY HARRY McCRACKEN

COMPUTER STORE HELL—we've all been there: Sales "help" that's anything but. Aisles obstructed by pyramids of printers and roaming 8-year-olds in search of the game department. Checkout lines that stretch from here to Kuala Lumpur. And a surly security guard who does everything short of turning you upside down and shaking you by the ankles to check for purloined products.

Buying PC items at retail isn't always this hellish, of course, but it's rarely heavenly. Small wonder, then, that mail order is such a popular alternative. Online merchandising isn't far behind—the research firm Gartner Group estimates that online consumer sales will reach $20 billion by the ▶

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ILLUSTRATIONS BY FRANCISCO CACERES

year 2000—an increase of 230 percent over this year's estimated $6.1 billion. The veteran retailer Egghead even shuttered its stores to stake its fortune online; the new Egghead.com is banking on consumers' desire for efficiency: Just pick up the phone or launch your browser, choose from a selection far broader than any retail store's, and sit back until the goods arrive—all without leaving the comfort of your office or home.

That's how mail order is supposed to work, anyway. The reality isn't always so rosy, as we discovered when we set out to compare 11 major mail-order merchants. Last winter, we found the best places to buy PCs (see "Store Wars," February, page 122); this time we went hunting for great deals on software, peripherals, and supplies.

The merchants we compare fall into several classes: traditional catalog vendors (CDW, Insight, MicroWarehouse, PC Connection, and PC Zone); Web-focused newcomers (Internet Shopping Network and NECX); the direct-sales arm of the country's biggest computer superstore chain (CompUSA Direct); and direct PC manufacturers (DellWare and Micron Additions). We didn't include Gateway because it restricts sales of software and peripherals to its PC customers. All but Internet Shopping Network take orders by phone as well as over the Internet (though NECX charges $25 for the privilege of dialing your order in).

To gauge the quality of the sellers, we went undercover. Operatives on both coasts combed the virtual aisles for 50 products—from mainstream Norton Utilities to obscure PC Card modems—and placed multiple orders with each vendor. We sought advice from sales reps before buying, compared prices, rated the quality of the service we received, noted how long it took our purchases to arrive, and tested warranty policies by returning products once they'd arrived—all without revealing our association with *PC World*.

In all, we placed several dozen orders. Eventually, nearly 200 products arrived on our doorsteps. We found two companies that significantly outperformed the competition: PC Connection and NECX (see "Top Mail-Order Picks"). We

Mail-Order Firms: The Best and the Rest

While many of the 11 merchants we evaluated scored well in specific areas, only two merit a recommendation: NECX and PC Connection.

VENDOR	In short	Selection	Price
CDW www.cdw.com	Solid selection, prices, and Web site; phone service was marginal, and some shipments were delayed.	Very good. Missing a few lesser-known software packages.	Good. Usually in the middle of the pack.
CompUSA Direct www.compusa.com	First-rate phone reps and above-average Web site; high prices and tight-fisted return policy.	Very good. Pretty extensive, although some obscure items weren't available.	Fair. Not stratospheric, but higher than average overall.
DellWare www.dell.com/products/dellware	Best warranty policies around, but not a leader in any other major area.	Fair. More than Micron, but a lot less than the others.	Fair. Generally higher than those of most competitors.
Egghead.com www.egghead.com	Appealingly low prices are overshadowed by shabby service and long waits for delivery.	Very good. Only slightly less extensive than the leaders.	Excellent. The least expensive of the bunch; cheap shipping, too.
Insight www.insight.com	Low prices and lots of choice, but the service was haphazard, and the waits for delivery were long.	Excellent. One of the widest range of offerings we found.	Very good. Low prices for most products on our list.
Internet Shopping Network www.isn.com	Okay Web-only vendor with a recently improved search engine; our product returns were a pain.	Good. Fine for most items; missing some less-familiar products.	Good. Usually fell somewhere in the middle.
Micron Additions www.micronadditions.com	Meager selection of products and a poor Web site; at least the return policies aren't bad.	Fair. Had almost none of the lesser-known items we wanted.	Good. A bit high on some items but not bad on average.
MicroWarehouse www.warehouse.com	Decent phone service and fast delivery; high prices, so-so Web site; warranty policies vary from product to product.	Good. Missing some obscure hardware and software products.	Fair. Higher than average in most cases.
NECX* www.necx.com	Fine destination for Web shoppers; feature-packed site, reasonable prices, and fairly quick delivery.	Very good. But vendor didn't have Carbon Copy, one of the products on our list.	Good. Usually not the cheapest, but never the highest.
PC Connection* www.pcconnection.com	Well-rounded vendor with lots of products at decent prices and speedy shipping; uneven warranty policies.	Excellent. Had most of what we needed, from the mundane to the offbeat.	Good. Sometimes a little high; competitive in most cases.
PC Zone www.zones.com	Competent phone service and Web site; somewhat pricey, with erratic warranty policies.	Good. Missing some obscure hardware and software products.	Fair. Often on the high side, rarely among the cheapest.

*Recommended

HOW WE TEST: Ratings are based on telephone and Web orders placed in June 1998 for peripherals, software, and supplies. Reporters in San Francisco and Boston placed a total of four orders to each vendor from a 9-item shopping list. Pricing and selection ratings are based on a 50-item master list;

also found some merchants that we wouldn't wish on our worst enemy.

When everything goes smoothly, mail order offers a great way to buy: It's efficient, economical, and blessedly free of hassles. When things go wrong—and boy, can they ever—well, let's just say that buying retail doesn't look so bad after all.

Top Mail-Order Picks

CALL US FUSSY, but we didn't find a single mail-order vendor that excelled in every area. Still, two clearly offered the best overall experience in our shopping tests. Catalog veteran **PC Connection** delivered (mostly) good phone service, a respectable Web site, competitive prices, and prompt delivery. The Internet-centric **NECX** proved to be the best Web site by far, with a smooth ordering and delivery process, and prices that beat PC Connection's.

SELECTION

STAGGERING VS. SKIMPY

BEST: Insight, PC Connection

WORST: DellWare, Micron Additions

Locating tough-to-find products may be the single best reason to shop by mail order rather than retail. After all, even megastores like CompUSA have a finite amount of space, so they tend to devote most of it to products that they can move in large quantities: big-name home PCs, popular peripherals such as ink jet printers, and mainstream software packages (an astonishing percentage of which come from a little company in Redmond, Washington).

That practice spells trouble if you need something even slightly off the beaten track—a specialized software package, say, or a toner cartridge for an aging laser printer. You're much likelier to find what you're looking for at a mail-order merchant. True, none we visited had all of the several dozen items on our master shopping list. And in some instances, products were out of stock. But the vast majority offered most of what we sought. ▶

Phone ordering	Web ordering	Delivery	Warranties and returns
Fair. One good phone experience, but other reps ignored requests and failed to return calls.	Good. Side-by-side product comparison feature, reviews, and basic product info; somewhat disorganized.	Fair. Some items arrived overnight; others were delayed by billing snafus.	Fair. 30-day guarantee with 15 percent restocking fee on nondefective hardware. Product return process was a major hassle.
Excellent. Quick, courteous, and knowledgeable; consistently top-notch.	Good. Meaty search options and a product comparison feature; some product listings are skimpy.	Very good. All products turned up within three days.	Poor. Offers price matching. Will accept software returns within 30 days, but takes back nondefective hardware for first 10 days only.
Good. Very courteous, though we spent a long time on hold.	Fair. Rather spartan; search tools could stand improvement; doesn't list shipping charges.	Good. A few delays, but most items arrived in a couple of days.	Very good. Only vendor here with a 30-day guarantee on everything—even opened software.
Poor. Long waits and uninformed sales reps.	Poor. Lacks order tracking and doesn't remember your shipping information.	Poor. Most products took weeks to arrive; others never showed up.	Poor. 14-day return period for hardware, 30 days for software; company charges 15 percent restocking fee on nondefective products.
Fair. Our reps were cheery, but slower than molasses in completing our orders.	Fair. Search tools are unwieldy; erratic product info; has compatibility checker.	Fair. Most items arrived within a few days, but some took almost two weeks.	Fair. 30-day guarantee on most products; 15 percent restocking fee on opened items; our returns took lots of effort.
Not rated. Vendor takes orders only over the Web.	Fair. Above-average search tools; quality of product specs is erratic; we found a bug.	Good. Products took between two days and a week to show up.	Fair. 30-day guarantee on most products; 15 percent restocking fee on opened items; cumbersome e-mail-based return procedures.
Fair. One rep knew his stuff; another was slow and unhelpful.	Poor. Skimpy info and poorly formatted pages; we found a bug.	Fair. Some orders arrived quickly, but others were delayed by weeks.	Good. 30-day guarantee; issues refunds for opened software, minus 10 percent restocking fee.
Good. Phone service ranged from respectable to excellent.	Fair. Nice product browser, but items are poorly organized; minimal search tools.	Very good. Everything came within three days.	Fair. Some products have a 30-day money-back guarantee; others do not; 15 percent restocking fee on computers.
Not rated. Phone orders subject to a $25 surcharge.	Very good. Price comparisons, reviews, and detailed specs; could use more search options.	Good. Everything showed up within one to five days.	Fair. 24-day return period for nondefective hardware; restocking fee for opened items.
Very good. But one rep gave us inaccurate advice about what type of RAM to buy.	Good. Nice product finder and tech-support features; needs better product info.	Excellent. All in-stock products arrived overnight, even when ordered late in the day.	Fair. 30-day guarantee on many products, but other nondefective items can't be returned if they've been opened.
Good. Not flawless, but fairly efficient and helpful reps.	Good. Easier to navigate than some; offers downloadable rebate coupons.	Good. All orders showed up within one to six days.	Fair. 30-day guarantee on many products; some nondefective items can't be returned if they've been opened.

phone ordering ratings based on efficiency and knowledge of phone representatives; Web ordering ratings based on design and content of Web site; warranty and returns ratings based on vendor policies and our product-return experiences.

In fact, it was remarkably easy to find such esoteric goodies as a spare docking cradle for an HP palmtop and a ten-pack of LANSource's Fax Plus Connect software—items you'd have a hard time finding in any retail computer store.

The only outfits that fell notably short in selection were DellWare and Micron Additions. Maybe that's because they're offshoots of big-league PC manufacturers. They offer bread-and-butter items like Microsoft Office and Adobe PageMill; but Dell stocked few of the more arcane items on our list, and Micron did not carry even such standard fare as cartridges for Syquest's SyJet drive. Despite their shallow offerings, however, these two companies may be worth considering because of their relatively generous return policies (see "Warranties and Returns: Payback Time").

PRICE

LET'S MAKE A DEAL

BEST: Egghead.com, Insight

WORST: CompUSA Direct, DellWare, MicroWarehouse, PC Zone

Overall, you can save money by buying from a mail-order outfit instead of a retail computer store. That stands to reason, since mail-order merchants have no expensive stores to operate and, in the case of Web-based transactions, no salespeople to pay. For the several dozen products we checked, even the costlier mail-order companies usually met or undercut retail prices. Bear in mind, though, that shipping costs eat up some of the difference—especially with heavy products, since almost all vendors calculate delivery charges by the pound.

In many instances, prices were surprisingly consistent: Almost everywhere we looked, an upgrade version of Microsoft Office Professional cost around $300, a 5.1GB Western Digital hard drive ran about $210, and Norton Utilities 3.0 was tagged at a little under $70. Some vendors (notably CompUSA Direct, Dellware, MicroWarehouse, and PC Zone) tended to charge higher prices, but in most cases the premium wasn't more than a few dollars. (It can add up, of course, if you buy a lot of products over time.)

Prices weren't always neck and neck, though. Egghead.com often quoted the lowest price by a sizable margin—a rock-bottom $114 for a Microtek ScanMaker E3 Plus scanner, for example, that cost $130 at PC Connection and $150 at Micron Additions. Egghead's shipping costs are cut-rate, too: You pay a flat rate for delivery per order ($15 for two-day, $8 for ground), even if you order lots of weighty items that would command huge delivery charges elsewhere.

But lowball prices aren't everything. And given the headaches we encountered—including subpar phone and Web ordering, slow delivery, and two orders that never arrived—we wouldn't rate Egghead.com as much of a deal at all. (Read on for details.) The situation was only slightly better at Insight, often the next-cheapest dealer. In our experience, competent service and brisk delivery are worth paying a little extra for, which is why the pricier NECX and PC Connection wound up as our top picks.

PHONE ORDERING

PERSON TO PERSON

BEST: CompUSA Direct

WORST: Egghead.com

MicroWarehouse's *über*-saleswoman, Kerry, has been grinning perkily from the corners of its catalogs for years, ready to receive calls. CDW's ads suggest that its reps can provide smart advice on thousands of products. Other mail-order vendors similarly play up the personality and wisdom of their staffs. But what can you really expect when you pick up the phone?

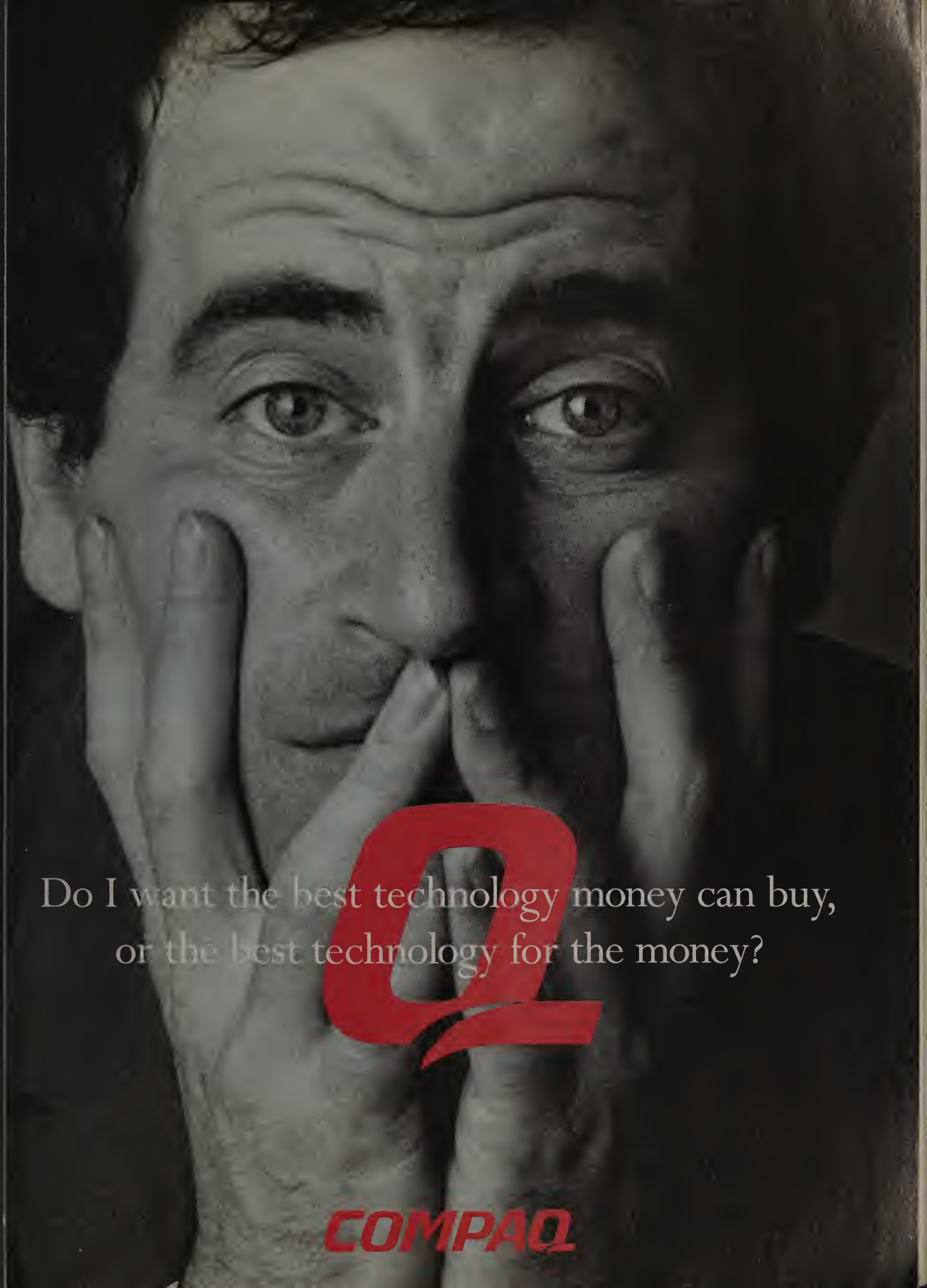
Compared to most retail-store staffers we've encountered, the mail-order sales reps we spoke to were surprisingly knowledgeable. Almost all had the skinny on the items we were considering, usually by consulting an online database (or oc- ▶

Catalog Shopping: What's It Going to Cost You?

Mail-order prices vary considerably, but be warned: The lowest prices came from Egghead.com, the vendor that earns our lowest ratings.

PURCHASE	Egghead.com	Insight	NECX	Micron Additions	Internet Shopping Network	CompUSA Direct	CDW	PC Connection	PC Zone	MicroWarehouse	DellWare
Iomega Zip disks (10-pack)	$106	$130	$108	$130	$120	$131	$130	$130	$130	$130	$114
Logitech MouseMan+	$45	$47	$47	$55	$46	$60	$49	$56	$56	$60	$59
Microsoft Office 97 Pro (upgrade)	$298	$295	$300	$300	$331	$310	$310	$308	$310	$310	$335
Symantec Norton Utilities 3.0	$62	$64	$64	$70	$69	$65	$67	$70	$70	$70	$71
Shipping and handling	$15	$10	$33	$9	$8	$10	$14	$12	$11	$11	$15
TOTAL	$511	$536	$551	$564	$566	$566	$570	$576	$577	$580	$594

Prices and shipping charges are as quoted by vendors during the week of July 19 and include two-day shipping except for PC Connection, which includes overnight delivery. State sales tax is not included. The products listed here are a subset of the products purchased by *PC World*.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- 24X Max CD-ROM[4]; K56flex modem[5]
- Integrated AC Adapter
- Multibay design
- 1-year limited warranty[6]

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Compaq Armada Notebooks

Armada 7400

The lightweight, durable notebook delivering a combination of high performance, desktop equivalence, and mobility.

$3,999*

Leasing Price: $132.93/month[1]

- Mobile Intel Pentium II Processor @ 266 MHz
- 4.0 GB SMART Hard Drive[2]
- 32 MB SDRAM (expandable to 128 MB)
- 13.3" CTFT (1024 x 768) display
- Powerful AGP Graphics
- 24X Max CD-ROM[4]
- Optional ArmadaStation Expansion Base
- Around 6 lbs. and only 1.6" thin
- Magnesium casing for durability
- 3-year limited warranty[6]

Armada 7800

The ultimate high-performance notebook delivering unprecedented functionality and mobile convenience.

$4,999*

Leasing price: $166.17/month[1]

- Mobile Intel Pentium II Processor @ 266 MHz
- 8.0 GB SMART Hard Drive[2]
- 64 MB SDRAM (expandable to 256 MB)[3]
- 14.1" CTFT (1024 x 768) display
- Powerful AGP graphics
- 24X Max CD-ROM[4]
- Optional ArmadaStation Expansion Base
- Integrated AC Adapter
- 3-year limited warranty[6]

Armada SB

The notebook designed for small businesses to provide productivity combined with high performance.

$2,299*

Leasing price: $76.42/month[1]

- Intel Pentium Processor with MMX™ Technology @ 233 MHz
- 4.0 GB SMART Hard Drive[2]
- 32 MB EDO RAM (expandable to 96 MB)
- 12.1" CTFT SVGA display
- 20X Max CD-ROM[4]; K56flex modem[5]
- Microsoft® Office 97 Small Business Edition
- Integrated AC Adapter
- Dual-bay design supports a second battery
- 1-year limited warranty[6]

Armada 1700 Options

- Compaq Value Carrying Case: **$49***
- Additional Li-Ion Battery: **$189***

Armada 7000 Series Options

- ArmadaStation Expansion Base for full desktop functionality: **$779***
- ArmadaStation Tower Stand: **$99***
- Compaq Briefcase: **$99***

Armada SB Options

- Additional 32 MB SDRAM Memory: **$115***
- Enhanced Smart NiMH Battery: **$99***

Small Business Server Solution

ProSignia 200 6/300

An integrated solution for small businesses needing inexpensive file/print, communications, or database capabilities and bulletproof server reliability.

$4,719*

Leasing price: $156.86/month[1]

- Intel Pentium II Processor @ 300 MHz
- 4.3 GB Wide-Ultra SCSI-3 hard disk[2]
- 64 MB ECC Memory (upgradable to 384 MB)
- 4/8 GB SLR enterprise-class tape drive
- Pre-Installed Microsoft BackOffice®
- Insight Agent Events Notification Tool monitors and reports potential server issues
- 3-year on-site limited warranty[6]
- For a limited time, free Compaq V55 15" (13.7" viewable monitor)[7] with 1-year on-site limited warranty[6]

Compaq Deskpro EP Series Small Business Solutions

Model 6266/2100/CDSM

The desktop developed to give small to medium-sized businesses the essential tools for success in today's competitive enviroment.

$1,359*

Leasing price: $45.17/month[1]

- Intel Celeron™ Processor @ 266 MHz
- 2.1 GB SMART II Ultra ATA Hard Drive[2]
- 32 MB SDRAM
- ATI RAGE IIC AGP Graphics
- 24X Max CD-ROM[4]; K56flex modem[5]
- Microsoft Word 97
- Compaq Microsoft IntelliMouse™
- Compaq V75 17" (16" viewable) monitor
- 3-year limited warranty[6]

Model 6300/4300/CDSM

The desktop developed to give small to medium-sized businesses the essential tools for success in today's competitive enviroment.

$1,719*

Leasing price: $57.14/month[1]

- Intel Pentium II Processor @ 300 MHz
- 4.3 GB SMART II Ultra ATA Hard Drive[2]
- 32 MB SDRAM
- ATI RAGE IIC AGP Graphics
- 24X Max CD-ROM[4]; K56flex modem[5]
- Microsoft Office 97 Small Business Edition
- Compaq Microsoft IntelliMouse
- Compaq V75 17" (16" viewable) monitor
- 3-year limited warranty[6]

Deskpro EP Options

- Additional 32 MB SDRAM Memory: **$139***
- Upgrade to Compaq V90 Monitor: **$349***
- SuperDisk LS-120 Drive: **$129***
- Compaq C-Series 810 Handheld: **$599***

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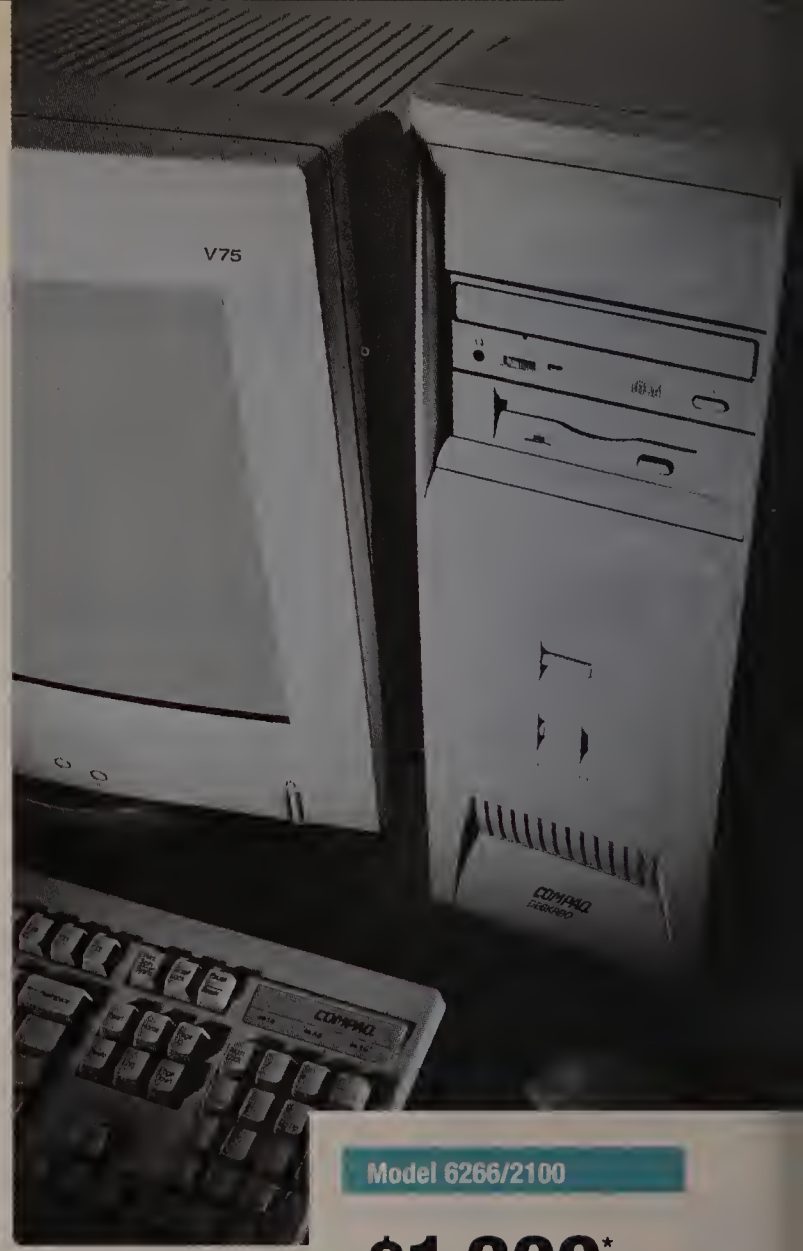

Compaq Deskpro EP Series

The business computers for those who crave the latest industry-standard technologies at very aggressive pricing.

Model 6333X/3200/CDS

$1,739*

Leasing price: $57.80/month[1]

- Intel Pentium II Processor @ 333 MHz
- 3.2 GB SMART II Ultra ATA Hard Drive[2]
- 32 MB SDRAM
- ATI RAGE IIC AGP Graphics
- 24X Max CD-ROM[4]
- Compaq V75 17" (16" viewable) monitor
- Towerable chassis converts from desktop to minitower
- 3-year limited warranty[6]

Model 6350X/6400/CDS

$2,069*

Leasing price: $68.77/month[1]

- Intel Pentium II Processor @ 350 MHz
- 6.4 GB SMART II Ultra ATA Hard Drive[2]
- 64 MB SDRAM
- ATI RAGE PRO TURBO AGP Graphics
- 24X Max CD-ROM[4]
- Compaq V75 17" (16" viewable) monitor
- Towerable chassis converts from desktop to minitower
- 3-year limited warranty[6]

Model 6400X/6400/CDS

$2,199*

Leasing price: $73.09/month[1]

- Intel Pentium II Processor @ 400 MHz
- 6.4 GB SMART II Ultra ATA Hard Drive[2]
- 64 MB SDRAM
- ATI RAGE PRO TURBO AGP Graphics
- 24X Max CD-ROM[4]
- Compaq V75 17" (16" viewable) monitor
- Towerable chassis converts from desktop to minitower
- 3-year limited warranty[6]

Model 6266/2100

$1,209*

Leasing price: $40.19/month[1]

- Intel Celeron™ Processor @ 266 MHz
- 2.1 GB SMART II Ultra ATA Hard Drive[2]
- 16 MB SDRAM
- ATI RAGE IIC AGP Graphics
- Compaq V75 17" (16" viewable) monitor
- Towerable chassis converts from desktop to minitower
- 3-year limited warranty[6]

Deskpro EP Options

- Additional 32 MB SDRAM Memory: **$139***
- Upgrade to Compaq V90 Monitor: **$349***
- SuperDisk LS-120 Drive: **$129***
- Compaq C-Series 810 Handheld: **$599***

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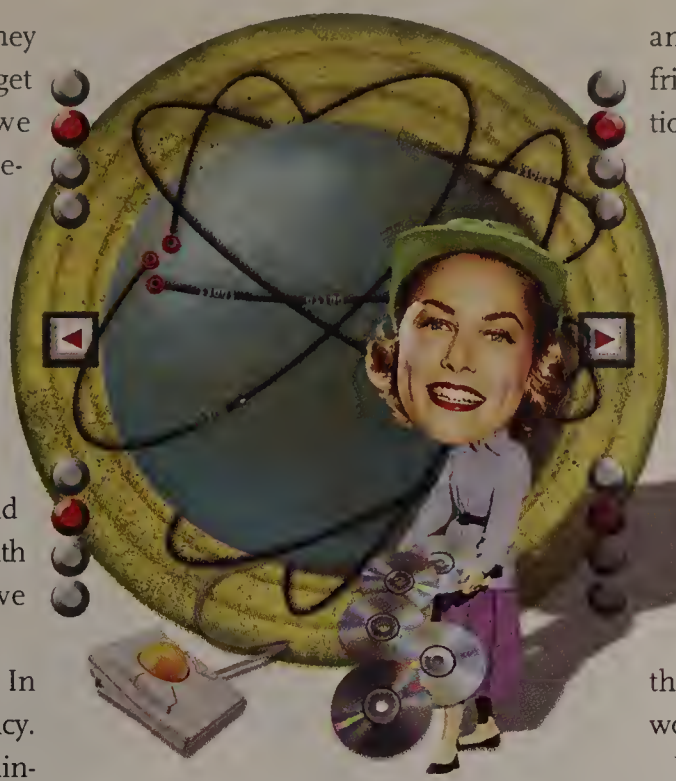
casionally, putting us on hold while they asked a coworker). What we couldn't get was savvy buying advice: When we asked for help in choosing a remote-control software package, for example, none provided a genuinely well-informed answer.

Still, assuming that you already know what you need, ordering by phone can be a breeze. At CompUSA Direct, DellWare, Micron Additions, MicroWarehouse, PC Connection, and PC Zone most of the folks we dealt with were courteous and efficient, and we were off the phone in minutes.

Other calls didn't go so smoothly. In most cases, the problem was inefficiency. Calls that should have taken 7 or 8 minutes dragged on for 15 or 20, as reps fumbled with their computers or asked us the same questions two or three times. One order with Bob at Insight stretched into a mind-numbing, daylong game of phone tag, and he never did find Logitech's MouseMan+ in his inventory list, even though the company sells it. We also had mouse mishaps at Egghead: Two reps said that the company didn't sell Microsoft's Intellimouse, and another said that it would cost us $276. (The real price was a more reasonable $52; this rep may have been looking at a listing for a software-and-mouse bundle.)

Over at CDW, we reached Rodney, who took our order and said he'd call back with prices. When we hadn't heard from him two days later, we tried again. Salesguy number two, Dan, steadfastly ignored repeated requests for a quote on a Kingston memory upgrade; he wanted to sell us a Simple Technology RAM module instead ("memory is pretty much all the same").

Just when we were ready to give up on CDW, we encountered Rolando, who completed our order quickly and pleasantly. Our experiences underscore an important point: The quality of salespeople at any merchant is bound to be inconsistent. When you happen to reach winners, note their names and extension numbers and ask for them next time; or ask friends and coworkers for recommendations before you pick up the phone.



WEB ORDERING

SO LONG, SALESPEOPLE?

BEST: NECX

WORST: Egghead.com, Micron Additions

If a so-so phone representative can muck up a mail-order purchase so badly, why not sidestep the sales staff altogether? After all, each vendor listed here runs a Web storefront, with selection, prices, policies, and shipping options that are virtually identical to what you would get if you bought over the phone.

We found that the biggest challenge of Web shopping involves finding the goods you need. Keyword searches often fail; we typed 'Microsoft Office' into Egghead.com's search engine and got bombarded with listings for more than 100 mostly irrelevant products. You can also browse through product lists sorted by category, but they're often haphazardly organized. Micron Additions, for instance, has a Software Suites section that includes neither SmartSuite nor WordPerfect Suite—even though the company sells both of these packages. Tracking down items was easier at PC Connection's site, which lets you restrict a search to a single product category (such as "Monitors & Video") and then sort the results by price or vendor.

Once we'd located the goods on our shopping list, we discovered that many sites' sales-processing and order-status features are buggy. Internet Shopping Network's order status page mixed up products and prices; NECX's sometimes booted us out after we'd typed the correct user name and password. Most baffling—and worrisome, from a privacy standpoint—the Micron site once welcomed us as Mark Lee of State College, Pennsylvania. (Don't worry, Mark, it didn't give us any of your credit information.)

While we can't give an unqualified rave to any Web site, NECX's is easily the best overall. It combines useful tools such as side-by-side feature compar- ▶

Top Tips for Savvy Shoppers

✔ **Consult a price-comparison Web site.** Services such as Excite's Product Finder (www.excite.com) offer a quick way to scout out bargains before you settle on one vendor.

✔ **Know thy salesperson.** Good salespeople are a precious resource; when you discover them, jot down their extensions so you can reach them directly next time.

✔ **Pool small orders.** Most mail-order vendors have a minimum shipping and handling charge of between $5 and $10. Try to order several items at once to reduce your cumulative shipping costs.

✔ **Have catalog numbers handy.** Ordering by catalog number will speed the process over the phone and online. Check a vendor's printed catalog beforehand.

✔ **Tell your credit card company what's up.** If you've requested that your order be delivered to a location other than the card's billing address, warn your credit card company in advance to prevent any processing delays. —H. M.

isons with links to online reviews and a handy-if-intrusive bit of software (also available from Insight) that checks your system's compatibility with a particular product. The NECX site also offers reasonably detailed product information, including such essentials as system requirements. (These spec sheets turned out to be vital; when we asked vendors questions by e-mail, we generally got useless automated responses, vague messages that didn't answer the question, or no reply at all.)

Four other vendors had above-average sites: CDW, CompUSA Direct, PC Connection, and PC Zone. But when all was said and done, none of the online sources matched the fast, cordial, and knowledgeable service we got from the best phone reps. Real salespeople—top-notch ones, anyhow—won't be rendered obsolete by Web commerce any time soon.

DELIVERY

THE WAITING GAME

BEST: CompUSA Direct, MicroWarehouse, PC Connection

WORST: Egghead.com

Mail order was not designed for consumers who crave instant gratification. Purchasing products over the phone or on the Web works only if you can afford to wait for delivery—overnight, at least, and often longer.

Sometimes a lot longer. Though CompUSA Direct, MicroWarehouse, and PC Connection managed to get us all of our in-stock products within three business days of the time we ordered, many other vendors' shipments took four, five, or more days to show up. This happened despite our specifying (and springing for) overnight or two-day delivery, except when CompUSA's salesperson correctly advised us that ground shipment would be just as quick.

What happened? The excuses were almost as varied as the products ordered. Most often, anti–credit card fraud policies bogged down the process. For instance, Rodney—the same CDW rep who failed to return our first call—eventually resurfaced to tell us that an order could not be shipped until we faxed him a copy of our driver's license and credit card. Though he maintained that this rule applies the first time any customer places an order for more than $500, it did not come up when we placed the order originally nor when we made an identical purchase over the Web.

Similarly, one purchase was delayed because PC Zone had trouble verifying our company name and address, which it attempts to do when the billing and shipping addresses differ. And nearly three *weeks* after we placed an order with Micron, a salesperson called with a billing question that was holding things up. It seemed that our original rep, Jamie, had quit his job without wrapping up our paperwork. (Thanks, pal.)

But when it came to delivery woes, Egghead.com was in a class by itself. We'd read the fine print on its site, so we knew that the company offered no guarantee about when it would ship our order, but it did promise to process the transaction the same day if we made the order before noon. Products began straggling in nearly two weeks after we ordered them, and two orders never arrived at all. Egghead had inexplicably canceled one; the other order, shipped via UPS, never turned up at our office.

Egghead.com CEO George Orban concedes that order fulfillment is currently a huge problem for the company: "Nearly half the calls coming into our call center are from people wanting to know where their orders are." The company's infrastructure, he says, was designed for the retail and catalog sales that made up the bulk of Egghead's business until the company closed its stores in February. In October, Egghead.com plans to launch a new electronic commerce system designed to make its order processing more ▶

Software Without the Wait

MY TAX RETURNS WERE DUE in less than 24 hours, and I needed the Massachusetts state filing edition of TurboTax—fast. But my local CompUSA was fresh out, as were Circuit City, OfficeMax, and Staples. Waiting for a mail-order copy was out of the question, so I went home and paid $25 to download it from Intuit's Web site.

Many major software vendors, including Lotus, Quarterdeck, and Symantec, now offer at least some of their wares through electronic software distribution. But the real hot spots for ESD are downloadable software megamalls such as **BuyDirect.com** (www.buydirect.com) and MicroWarehouse's **Download Warehouse** (www.downloadwarehouse.com). The drawbacks: large programs can take a while to download, and not having a setup CD-ROM could be a problem if the application ever became corrupted. (I always keep a copy of the install file on a Zip disk.)

For software companies, ESD is a dirt-cheap way of selling. Unfortunately they don't pass the savings on to you—prices are about the same as retail or mail order. And until modems get faster, you'll probably want to buy most of your software the old-fashioned way. Still, when you need a product right this minute, ESD makes sense. —H. M.

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★ *Second Pentium II Processor at 450MHz, add $1899.*

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- **9GB Ultra-2/LVD SCSI Hard Drive**
- 32X Max^ Variable SCSI CD-ROM Drive
- HP OpenView NNM Special Edition
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★ *Add a 9GB Ultra-2/LVD SCSI Hard Drive for $799.*

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Business Lease◊: $130/Mo., 36 Mos.

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PENTIUM II PROCESSOR AT 350MHz

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★ *Upgrade to 128MB 100MHz ECC SDRAM, add $285.*

★ *Upgrade to a Pentium II Processor at 400MHz, add $300.*

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Online Auctions: Going Once, Going Twice?

CATALOGS AREN'T the only online shopping game in town: Web surfers with a twitchy mouse finger and an eye for bargains can find great deals by browsing the online auction sites, which pit eager purchasers against each other. As in a conventional auction, the highest bidders win. Some of these sites, like Egghead's Surplus Auction, specialize in technogoods; others, like the popular eBay (www.ebay.com), offer everything from antiques to trading cards. If you don't want to get burned, however, it helps to follow a few simple rules.

Ask yourself, "Do I really need this?" You may have second thoughts about that fur-lined monitor hood when UPS arrives at your doorstep later in the week.

Do your research. Before you place a bid, check print catalogs and Web sites like www.shopper.com and www.junglee.com to find out what an item retails for.

Show restraint. Set a limit, and don't bid beyond it.

Use a credit card. As with any purchase, paying with plastic gives you the final say in a dispute.

Have fun. Bidding is a strategy game, and you don't even have to win to enjoy the suspense.

Ready to go Windows shopping? Here are a few sites that will take you where the auction is:

- **First Auction** www.firstauction.com
- **Onsale** www.onsale.com
- **UBid** www.ubid.com
- **WebAuction** www.webauction.com
- **DealDeal.com** www.dealdeal.com

—Steve Fox

efficient and accurate. "We're cognizant of our problems," says Orban, "but we're new to this business."

Given the erratic delivery of our shipments, we offer the following advice: When buying over the phone or online, double-check that any products you need right away are in stock and ready to go. Keep tabs on your pending purchases by calling the vendor or checking its Web site (most offer automated order-status services). And if a crucial deadline is breathing down your neck, consider looking for the product at a local retailer before gambling on a mail-order vendor.

WARRANTIES AND RETURN

PAYBACK TIME

BEST: DellWare, Micron Additions

WORST: Everybody else

Intimidating. Strewn with legalese. Pockmarked with caveats, exceptions, and subtle gotchas. No, we're not describing a Donald Trump prenuptial agreement; we're talking about the return policies instituted by mail-order vendors. They're stingy these days—enough so that our enthusiasm doesn't extend beyond DellWare and Micron Additions, which offer a 30-day return period on everything (though Micron does impose a 10 percent restocking fee on opened software.)

Take, for instance, the incredible shrinking 30-day money-back guarantee. CompUSA Direct will take back nondefective hardware only during the first 10 days after the invoice date; Egghead accepts them for 14 days, and NECX for 24. At other companies, the 30-day return period is still alive but hardly in robust health. Several vendors, for example, won't take back Compaq, HP, or IBM products at all; instead, they instruct you to take up your gripe directly with the manufacturer. And CDW, Insight, Internet Shopping Network, and NECX all charge a restocking fee (usually 15 percent) for opened, nondefective hardware.

Some catches are just about universal. None of the companies we looked at will refund your shipping charges, nor will they foot the bill for return shipping. So if you return something bulky—a workgroup printer, say—you could be out $100 or more in back-and-forth delivery costs. Crack the shrink-wrap on a software package, and (assuming it's not defective) in most cases it's yours forever.

The process of returning products mirrored the quality of our original buying experience. It was relatively painless with most vendors, but we had to jump through hoops at CDW and Insight. Egghead charged us a restocking fee, even though none was mentioned on its Web site. And one CompUSA Direct rep told us we couldn't return our software, as more than ten days had elapsed since we bought it. When we spoke to a manager and politely reminded him that the company's rules clearly establish a 30-day return period for unopened software, the company relented. The lesson: Read the vendor's warranty policies, know your rights, and stick up for them when necessary. Happily, all the vendors refunded our money quickly.

FINAL ANALYSIS

So the question remains: Does buying software, peripherals, and supplies by mail order make more sense than heading for a store? Not always. Even mail-order aficionados will sometimes opt for a nearby store for minor purchases and items that they need immediately. Our subpar mail-order experiences were just as aggravating as a bad retail encounter, maybe more so.

But every PC user should have a good mail-order firm in his or her shopping arsenal. It's economical in terms of time and money, and downright essential when you need products you can't find locally. Another point: The rivalry among mail-order companies is intense, especially on the Web. Such competition is bound to have a positive effect on service and prices—and that's a boon to all of us who buy computer products.

Harry McCracken is a senior writer and Steve Fox is the editor for PC World. *Additional research by Staff Editor Angela Navarrete and Joan Swarms.* ▶

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Intel Tech Buzz

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"The combination of Dell* engineering and Intel's Pentium® II Xeon™ processor provides customers with a high-performance engine for their enterprise applications. Dell-engineered systems management, serviceability and high-availability features, and the Pentium II Xeon processor's faster system bus, larger Level-2 cache and updated PCI chipset will help further advance the adoption of standards-based computing at the high-end of the computing spectrum."

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Director of Server Brand Marketing
Dell Computer Corporation

"The Pentium II Xeon processor allows HP* NetServer systems to deliver the increased scalability and performance required by mission-critical applications. HP's upcoming data-center optimized NetServers will use the Intel® Pentium II Xeon processor and will focus on offering the high availability and scalability expected by enterprise customers...."

Gabe Gotthard
Product Marketing Manager
Enterprise NetServer Division
Hewlett-Packard Company

While Intel was introducing the Pentium II Xeon processor, premier IBM* beta-customer, Norwest, was already testing the latest Netfinity technology. "The IBM Netfinity 7000 M10 with the Intel Pentium II Xeon processor is a highly developed and engineered machine with the type of performance, high-availability, manageability and redundancy measures that we are looking for to take us into the future."

John Bolz
Senior Technology Advisor
Norwest Financial

PENTIUM® II XEON™ PROCESSOR

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Room to Grow. Servers and workstations based on the Pentium® II Xeon™ processor are designed from the outset for scalability, giving companies headroom to grow and meet a wide range of computing needs. The capability is already in place for creating dual-processor workstations and two-way and four-way servers, and eight-way configurations are due early 1999. The Virtual Interface (VI) architecture provides a new mechanism for low latency communications between larger symmetric multiprocessing (SMP) clusters.

Enterprise-Class Reliability and Manageability. To promote high availability, systems include such features as an on-core thermal sensor and a separate system management bus. Many systems adhere to industry-wide specifications such as Wired for Management (WfM) and the Intelligent Platform Management Interface (IPMI), to increase manageability and uptime.

Broadest Range of Software. Systems built around the Pentium II Xeon processor run the full range of enterprise and workstation applications for both the Unix* and Windows NT* server operating systems—from database and ERP software to movie special effects to mechanical design applications. Workstation users no longer need separate systems for technical and productivity applications. And Intel® Architecture-based servers and workstations are backed by a wide choice of vendors, support options, add-ins and peripherals.

Server/Workstation Requirements	Technical Features
PERFORMANCE	• P6 microarchitecture • Processor core and cache run at 400MHz (450MHz by year end) • 100MHz system bus • 32K L1 cache; up to 2MB L2 cache by year end • I,O* capable; dedicated I/O processors • Up to 64GB addressable memory • >4GB memory support through ESMSA • Multiple 32-/64-bit PCI buses • State-of-the-art SEC cartridge packaging
SCALABILITY	• 4-way SMP+ cluster support[1] via Intel® 450 NX PCIset • Larger SMP clusters via VI architecture
SOFTWARE CHOICES	• Unix*, Windows NT* and NetWare* operating systems • Industry's broadest range of applications
AVAILABILITY/MANAGEABILITY	• Wired for Management • Intelligent Platform Management Interface • Thermal sensor • Error Correction Code (ECC) • Functional Redundancy Checking • System management bus

[1]Scheduled early 1999.

Flexibility from Top to Bottom. Whether companies are adding servers or workstations or replacing RISC and legacy systems, systems based on the Intel Pentium II Xeon processor provide unsurpassed performance at an affordable price, as well as a bridge to Intel's 64-bit Merced™ processors. Intel Pentium II Xeon processor-based servers and workstations can help businesses make their information infrastructure more powerful, robust and versatile, and their company more competitive.

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Rebate or Rip-Off?

Months ago, we purchased a score of PC goodies and waited for all our rebate checks to roll in. We're still waiting.

BY ROBERTA FURGER

AIR FORCE CAPTAIN Johnny Reed thought he'd found a winner. Avatar Peripherals' Shark 250, a portable storage system for notebooks, was selling at Computer City for $199 with a $50 rebate. He mentally adjusted the price down to $150—a deal by anyone's standards—and headed for the cash register. Never mind that he was actually paying $200. He just had to fill out the paperwork and wait a few weeks for his check.

At least that's what Reed thought when he bought the Shark back in September 1997. But after eight months, his $50 rebate check still hadn't arrived, and Reed had a different impression of Avatar's seemingly great deal and of rebates in general. "I love the product," he says, "but the rebates are a bigger hassle than they're worth."

THE CHECK'S IN THE MAIL —OR IS IT?

REED'S EXPERIENCE isn't unique. In the past year, *PC World* has received many letters from irate consumers who filled out rebate forms, clipped UPC codes, and mailed off their proofs of purchase, but never received the promised check. Their purchases run the gamut: Zip drives from Iomega, modems from 3Com/U.S. Robotics, virus detection software from McAfee, and more.

Rebates are nothing new to the PC industry. Software companies in particular have been using them for years to boost sales and garner information about consumers. But as the marketplace has grown more competitive, the use of rebates—and the value of the offers—has skyrocketed. Big $40 and $50 ▶

rebates have become commonplace as peripherals companies fight for market share. Hewlett-Packard, Compaq, and others offer rebates of $100 or more for items like PCs or printers.

Why the explosion of rebates? They give the perception of savings without requiring a company to actually drop prices. Retailers like CompUSA and Computer City advertise rebates aggressively to draw traffic into their stores. Their Sunday circulars typically feature the post-rebate price in big, bold type, with only a small notation that the highlighted price is "after rebate." Web retailers, too, use rebates to increase sales.

As hardware and software companies are quick to point out, when a promotion goes smoothly, everyone wins: Consumers save money, and retailers and vendors reap the added revenue. But fewer than half of all consumers who are eligible for rebates actually submit the necessary forms (estimates range widely, from 2 to 40 percent, depending on who is providing the statistics). In addition, poor planning, an ill-equipped fulfillment house, or a cash-strapped business can quickly destroy a rebate promotion—and with it customers' faith in a company.

Just ask Iomega, which became embroiled in a class-action lawsuit last year after thousands of customers complained about the firm's failure to process rebate checks for its Zip drive in a timely fashion. The company has finally caught up with the backlog and, as part of the settlement, has issued $3 coupons good toward the purchase of any Iomega product to consumers who participated in the original promotion.

PC WORLD GOES SHOPPING

GIVEN THE WIDESPREAD use of rebates—and the high volume of complaints the promotions generate—*PC World* decided to put various companies' rebate programs to the test. In March we bought 15 hardware and software products with rebates ranging from $10 to $50 (see "The Rebate Waiting Game"). Where possible, we duplicated purchases, buying two of each product; in some cases only one was available. Like thousands of consumers before us, we filled out forms, collected the required proofs of purchase (receipts, UPC codes, and the like), and then waited for our checks to arrive.

In some instances, the wait was surprisingly brief: Our TimeSlips rebate came less than three weeks after we mailed the forms; checks from Microsoft (for Office 97) and Intuit (for TurboTax and Quicken Deluxe) also arrived well before the end of the six-to-eight- ▶

The Rebate Waiting Game

Though many rebates arrived when expected or even earlier, we waited well past the promised turnaround time for others. Some never came.

PRODUCT	Purchase price	Rebate amount	Promised arrival time	Actual arrival time
Early and on-time arrivals				
Intuit TurboTax/Quicken Deluxe [1]	$28, $60	$20	6 to 8 weeks	2 weeks early
Kiplinger TaxCut Deluxe [2]	$30	$10	6 to 8 weeks	on time
Maxtor 4.3 GB Hard Drive	$230	$30	12 weeks	5 weeks early
Microsoft Office 97, Small Business Edition Upgrade [3]	$240	$40	6 to 8 weeks	3 weeks early
Microsoft Office 97, Standard Edition [3]	$230	$40	6 to 8 weeks	1 week early
Sage U.S. Timeslips Personal 5.5 [2]	$80	$25	6 to 8 weeks	4 weeks early
Symantec Act 3.0 [2]	$170	$50	8 to 10 weeks	1 week early
Better late than never				
Dr Solomon Anti-Virus [2]	$50	$10	8 to 12 weeks	2 weeks late
Labtec 2412 Speakers	$100	$20	4 to 6 weeks	3 weeks late
McAfee VirusScan	$40	$20	6 to 8 weeks	7 weeks late
Still waiting				
Avatar Peripherals Shark 250	$200	$50	4 to 6 weeks	rebate not received [4]
Diamond Stealth II S220	$125	$20	2 to 4 weeks	2 weeks late; rebate not received [5]
Hayes 56K Internal K56 Flex Modem	$130	$40	8 to 12 weeks	rebate not received
Micrografx American Greetings Create-A-Card	$50 [6]	$15	8 to 10 weeks	2 weeks early; rebate not received [5]

[1] Rebate required purchase of both products.
[2] Only one purchased (no duplicate) due to limited supply.
[3] Rebate for upgrades only.
[4] One rebate replaced by alternate offer.
[5] One of two rebates received.
[6] Second copy purchased for $40.

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Getting the Most From Rebates

REBATES CAN BE the source of great cost savings—or huge headaches. Here's how to profit from the promotions everyone loves to hate.

■ **Don't let a rebate bait you.** Never buy a product just because of the rebate, no matter how big a refund check is offered.

■ **Check the pulse.** Note the expiration date of the rebate offer before purchasing a product. Stores often forget to remove expired promotional material. Don't assume that an offer is still valid just because the sticker is still on the box or the coupon is still in the store.

■ **Examine the small print.** Carefully read and follow all directions. While some fulfillment houses contact consumers who submit incomplete claims, others, we are told, simply "toss the papers in the trash" if any information is missing.

■ **Keep all your documentation.** Make copies of your receipt and supporting material. Note when you mailed the materials or get proof of mailing.

■ **Be persistent.** Keep track of when your check should arrive and contact the company if it's late. Even if a representative refers you to a rebate fulfillment house, ultimately it is the company's responsibility to make sure you're paid.

week processing period. Other rebates, like our $20 check from Labtec and the $10 from Dr Solomon, came late, but at least we got the money. At press time—a full 20 weeks after mailing in our redemption forms—we have yet to receive rebate checks for four of the products. The missing rebates include a $50 check from Avatar, $40 from Hayes, $20 from Diamond, and $15 from Micrografx.

Once the specified processing time had passed, we contacted the remiss companies to check the status of the overdue rebates (without mentioning that we represented *PC World*). The reactions were remarkably uniform. First came the explanation: "We were overwhelmed by the response to our offer." Then, the apology: "We're sorry for the delay." And finally, the assurance: "We are processing checks as fast as we can."

Most companies provided us with toll-free numbers for the fulfillment houses that process the rebates and send out the checks, so we could check on the status of our rebates. Among the tardy companies, Hayes was particularly responsive, even giving us the direct line and e-mail address of the manager overseeing the rebate promotion (unfortunately, she never responded to our query).

Avatar gets the award for the most original response. Our two reporters both were told not to expect their checks to come any time soon—if ever. In lieu of checks, Avatar offered them a 250MB hard disk and a carrying case (a $60 total value, we were told). One of our reporters took Avatar up on the alternate offer—as did a reluctant Johnny Reed. In both instances, the merchandise arrived as promised in a couple of days. When asked about the $50 due, one representative said bluntly, "You can wait for the rebate, but I can't say when it will arrive."

"Rebates are only as good as the check in the mail."

—Cleo Manuel, vice president, National Consumers League

The explanation for the delay varied depending on who our reporters talked to. One person blamed "computer error at the fulfillment house," and Bill Burch, the company's direct sales manager, told us there were "changes going on internally" and that "rebates had been frozen."

A company spokesperson for Avatar in Milpitas, California, told us in early July that customer response to the $50 promotion far exceeded expectations, and in May the company decided to eliminate the rebates and simply drop the price on all its products by $50. At press time, however, we learned that Avatar had filed for Chapter 7 bankruptcy, though we were unable to reach anyone for comment.

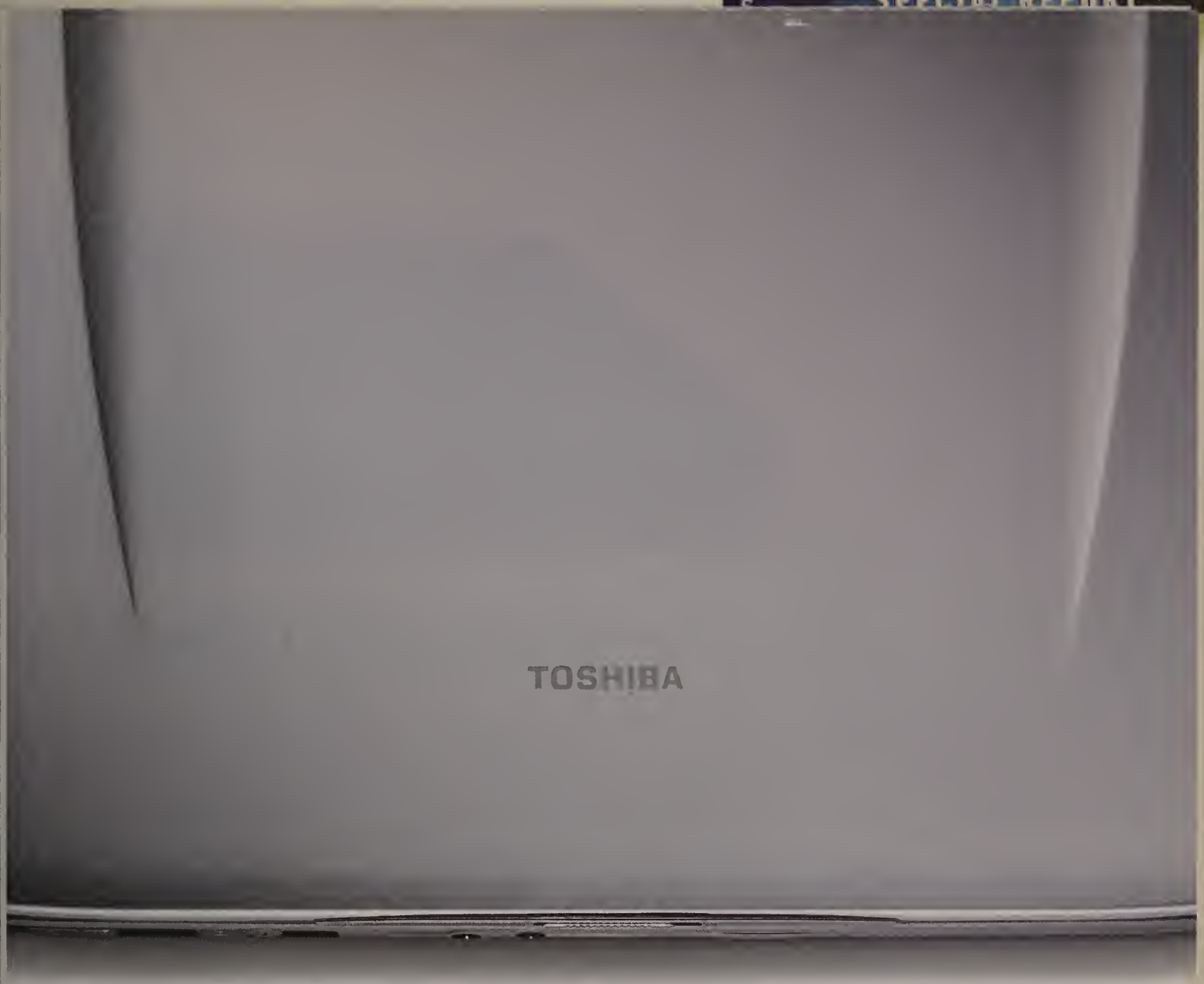
DON'T COUNT YOUR REBATES BEFORE THEY'RE CASHED

ALTHOUGH AVATAR'S decision to drop the price on the Shark came too late for consumers who banked on the $50 rebate, it was a step in the right direction. "Consumers would be better served if companies simply offered the best, fairest price [in the first place]," says Cleo Manuel, vice president for public affairs of the National Consumers League in Washington, D.C.

Manuel advises consumers to think twice before being seduced by a sales promotion. "It's your money, and it's worth your time to consider all offers carefully," rather than simply buying a product because of an attractive rebate. "Rebates are only as good as the check in the mail," she says, "and many, many steps have to be followed before that check ever arrives."

The bottom line: Don't let potential savings from a rebate check determine your purchase. Consider your needs and finances, then buy the product that best fits both criteria. And if that product happens to come with a rebate, send in the forms, keep track of the due date, and don't give up until you're paid.

Roberta Furger is a PC World *contributing editor and author of* Does Jane Compute? Preserving Our Daughters' Place in the Cyber Revolution *(Warner Books, 1997). Staff Editor Angela Navarrete also contributed to this story.* ■



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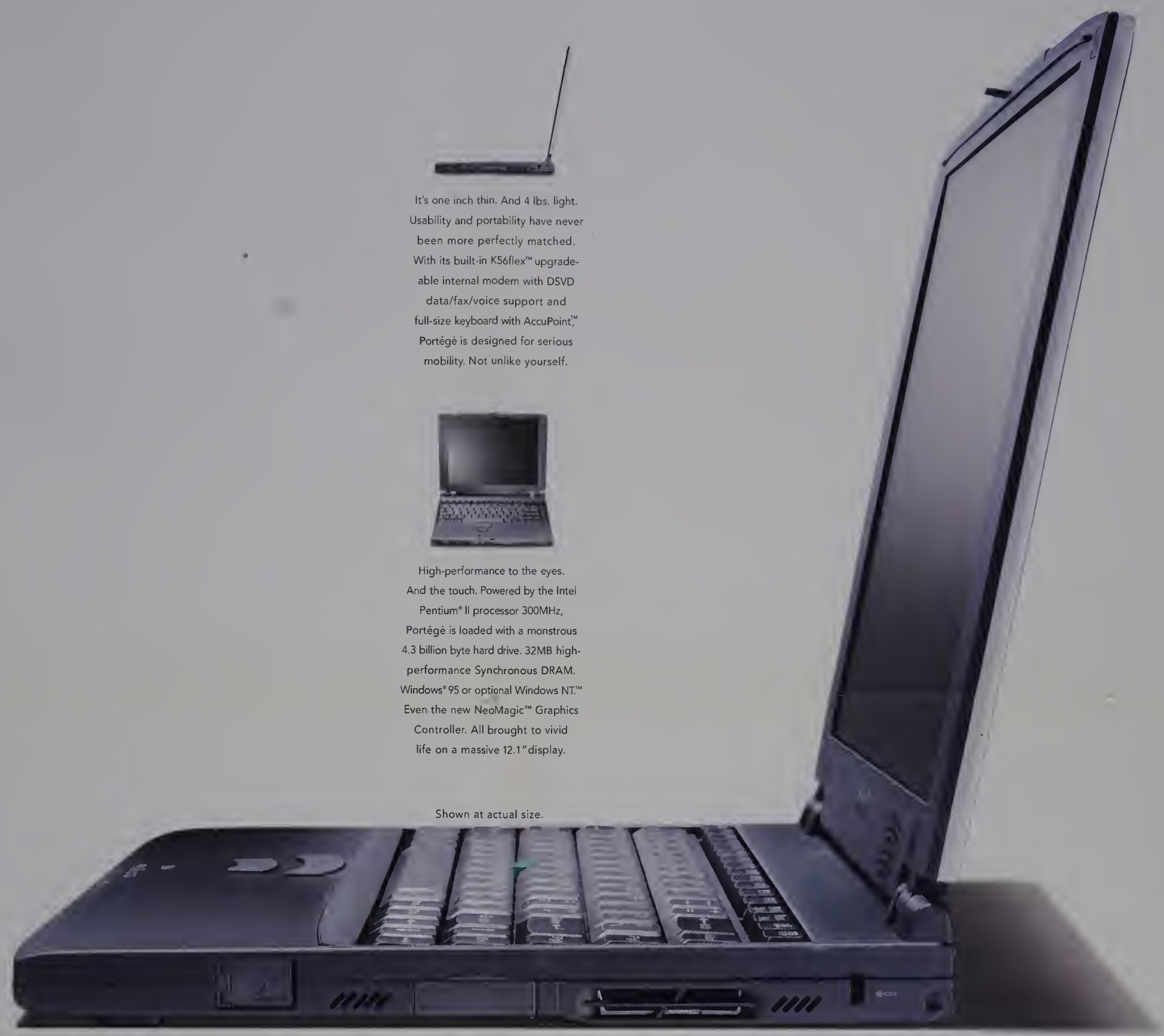

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ARE YOU BEING SERVED?

New servers for small businesses and departments show off ultraspeedy processors and low prices. We pit five cutting-edge servers against a pair of older siblings—the results will surprise you. ▶

BY JOHN BASS

ILLUSTRATIONS BY DAN PICASSO

BEHIND EVERY GREAT PC stands a great server—many servers, actually. These silent workhorses fetch our files, run the nitty-gritty applications that keep our businesses in business, and (most conspicuously) host our Web sites.

If there were no servers, there would be no World Wide Web. And in turn, the Web is the main force driving today's huge growth in server sales. Every major PC vendor has piled into this formerly niche market. The result: You can enjoy soaring performance at plummeting prices, and you can get fancy, high-reliability features from affordable workgroup/department servers instead of spending $30,000 on roaring behemoths behind a glass wall.

For this review, we looked at seven of said workgroup servers running Windows NT Server 4.0 (the fastest-growing server operating system), including Acer's AcerAltos 9100, Compaq's ProLiant 1600, Dell's PowerEdge 2300, Gateway's ALR 8200, Hewlett-Packard's NetServer LH3, Micron's NetFrame LV2000, and NEC's Express5800 LS2400. Each server we tested comes with dual Pentium II processors, 128MB of RAM, at least two SCSI hard drives, and a 100-megabits-per-second network card.

These beasts aren't cheap: Prices range from less than $4500 to more than $13,500, though you can buy a rock-bottom server from a major vendor for as little as $3000. For the money, however, they offer an excellent combination of speed, storage, and specialized features such as redundant, "hot-swappable" components (meaning they can be replaced while the server is running).

Estimating the maximum number of users a workgroup server can support is hard, since every network or Web site is a unique environment, but in some roles these machines are capable of supporting hundreds of users.

The tests for this roundup were conducted at Centennial Networking Labs, a hardware testing facility near Raleigh that is affiliated with North Carolina State University. For performance testing, we turned to three commercial server benchmarking packages: Bluecurve's Dynameasure File Professional 2.0 and Dynameasure SQL Professional 2.0 test suites, and Mercury Interactive's LoadRunner (see also "How We Test Server Performance"). We evaluated each server on a combination of performance (30 percent), features (30 percent), pricing (30 percent), and support policies (10 percent). The highest scorer was Compaq's ProLiant 1600, our Best Buy.

Most of the servers came with the latest speed-enhancing hardware available at press

Best Buy

COMPAQ PROLIANT 1600

Combining an enviable record of unparalleled performance in our file service tests and good scores in our Web and database service tests with a reasonably good price, Compaq's ProLiant 1600 wins our nod as the Best Buy server. The ProLiant 1600 features easy manageability, an excellent set of components, state-of-the-art performance-enhancing hardware, and Compaq's self-monitoring Insight Manager software package. Compaq's warranty allows administrators to obtain replacement parts before they fail, if Insight Manager indicates that failure is imminent.

VENDOR	Street price[1] (as of 9/15/98)	Dual CPUs	Maximum memory[2]/ memory type	Expansion slots (total/ open)	Integrated SCSI controller	RAID controller/ cache RAM
Acer AcerAltos 9100 800/733-2237 www.acer.com	$4375	PII-300	512MB/EDO	7/6	Adaptec 7880 Dual Wide-Ultra	Mylex PCI/8MB
Compaq ProLiant 1600 800/888-0220 www.compaq.com	$7497	PII-400	1GB/SDRAM	6/6	Symbios Logic 876 Dual Wide-Ultra SCSI-3	none (RAID in NOS)
Dell PowerEdge 2300 800/999-3355 www.dell.com	$8639	PII-400	1GB/SDRAM	6/5	Adaptec 7860 Ultra	Dell PERC RAID/32MB
Gateway ALR 8200 800/799-2000 www.gateway.com	$11,319	PII-400	1GB/SDRAM	8/7	Adaptec 7890 Dual Wide-Ultra	AMI 466 RAID SCSI2/16MB
HP NetServer LH3 800/752-0900 www.hp.com	$13,566	PII-400	1GB/SDRAM	8/7	HP SCSI2 LVD	HP NetRAID (integrated)/16MB
Micron NetFrame LV2000 800/209-9686 www.micronpc.com	$5897	PII-300	512MB/EDO	5/4	Adaptec 7880 Dual Wide-Ultra	Adaptec Array 1000/4MB
NEC Express5800 LS2400 888/863-2669 www.nec-computers.com	$8562	PII-400	1GB/EDO	5/5	NEC Dual Wide-Ultra	AMI 762/16MB

Best Buy

[1] Street price includes Windows NT Server 4.0, with ten user licenses; when vendors did not include NT, we added $700 (Egghead.com's price). Price excludes monitor.

[2] All systems tested with 128MB of ECC RAM.

[3] Optional equipment.

The latest NT servers, clockwise from top left: Gateway's ALR 8200, Acer's AcerAltos 9100, HP's NetServer LH3, NEC's Express-5800 LS2400, Dell's PowerEdge 2300, and Micron's NetFrame LV2000.

time: Intel's PII-400 processor, with its 100-MHz system bus and faster SDRAM DIMM memory, took care of the processing load; superfast Wide-Ultra SCSI disk controllers and heavy-duty Redundant Array of Independent Disks controllers managed the hard drive access.

During the period when we did our testing, servers equipped with Intel's much-hyped Xeon processors hadn't yet reached the market; Xeon improves on its predecessors by providing CPU-speed level-2 cache memory, as well as larger memory addressability and the ability to fit smoothly into four-processor configurations with standard Intel chip sets.

We expected the PII-400–based servers to outperform the slightly older PII-300–based models, but our tests demonstrated that the benefit of the faster CPU clock was minimal (except in the case of our SQL/database tests; see "Fast, Faster, Fastest" for specific test scores). To our surprise, we found that the two PII-300 systems in our review outperformed the five PII-400 servers on our Web service tests by a substantial margin. They also did well on the file service tests, thanks to their Wide-Ultra disk controllers and perhaps also owing to their RAID cards. These RAID cards—which are standard equipment on today's servers—are designed to distribute data across multiple drives, thereby improving reliability and (sometimes) performance.

Servers typically come bundled with special software to help you install network operating systems such as Windows NT Server and Novell NetWare (and ▶

Hard drive/speed (rpm)	Max. hot-swap bays/ max. total bays/ max. storage (GB)	Network interface	Reliability features	NOS installation/server management software	Warranty and phone support	InfoNet number[4]
IBM Ultrastar 9ES (DDRS-34560)/7200	8/13/198	Intel 82557 10/100 (integrated)	hot-swap drives, redundant power supplies, auto & remote server reboot[3]	StartUp EasyInstall/Advanced Server Manager Pro, Remote Diagnostic Manager (full remote management)	3-year parts/labor/on-site, next business day; 24-hour toll-free phone support	614
Seagate Cheetah/ 10000	5/7/63.7	Netelligent 10/ 100 TI TLAN (integrated)	hot-swap drives[3], redundant power supplies, auto & remote server reboot[3]	Compaq Smart Start/Compaq Insight Manager (full remote management)	3-year on-site, prefailure warranty on hard drives, RAM, and processors; free phone support	615
Seagate Cheetah/ 10000	6/9/54	10/100 Intel ProB (PCI)	hot-swap drives, redundant fans[3], auto server reboot[3]	none/Dell OpenManage (full remote management)	3-year parts, 1-year labor; free phone support	616
Seagate Cheetah/ 10000	4/6/54	Intel 5255B 10/100 (integrated)	hot-swap drives, redundant hot-swap power supplies, redundant fans	none/Gateway InfoManager (in-band remote management)	3-year parts/labor/on-site, next business day; free phone support	617
Seagate Cheetah/ 10000	14/12/144	HP 10/100 D5013A (PCI)	hot-swap drives[3], redundant hot-swap power supplies[3], redundant hot-swap fans, automatic server reboot[3]	TopTools/ManageX, PCAnywhere, HP Navigator (full remote management)	3-year parts/labor/on-site, next business day; free phone support	618
Western Digital Enterprise/7200	5/5/45	Intel 82557 10/100 (integrated)	hot-swap drives[3], redundant fans[3], auto & remote server reboot[3]	Intel Country Kit/LANDesk Server Manager (in-band remote management)	5 years on CPU and system RAM, 3 years all other hardware, 1 year on-site labor; free phone support	619
Seagate Barracuda/ 7200	none/4/36	Intel Pro 100+ 10/100 (integrated)	remote shutdown and reboot	ExpressBuilder/ESMPRO (full remote management)	3 years, parts and labor; free phone support	620

[4] For more information about all products in this table, select InfoNet no. 910 or visit www.pcworld.com/infonet.

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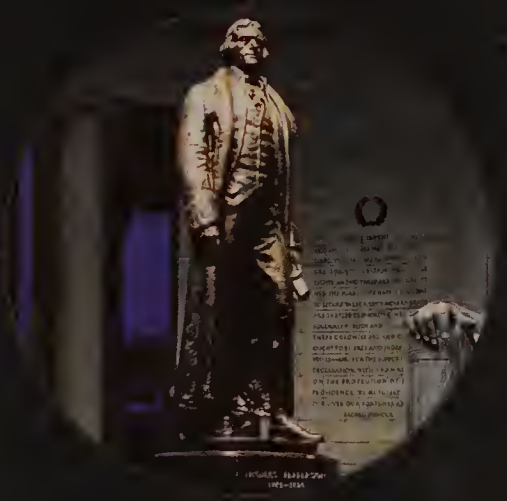

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Answers for the Information Age

in some cases, popular server applications). All the machines in our review come with server management software that lets you monitor the system closely and alerts you to problems. Many servers also include remote management software that allows administrators to make software repairs (and in some cases, to reboot the server) from anywhere.

Our Best Buy server—Compaq's ProLiant 1600—offers muscular performance, easy setup and service, powerful features, and a fair price. The runner-up, Dell's PowerEdge 2300, is well-rounded with a strong feature set, but its performance doesn't quite match the ProLiant's.

ACER ACERALTOS 9100

The AcerAltos 9100 is eminently affordable but not particularly powerful. It's roomier than most servers and carries a great bundle of self-configuration and maintenance utility software, and at $4375 it's the lowest-priced PII-300–based server we evaluated—by $1500. But it also scored dismally in two of our benchmark performance tests.

On the upside, the AcerAltos 9100 is designed to be as configurable as possible. Inside the case are eight hot-swappable hard drive bays, a pair of slots for redundant power supplies, and ample space to reach the motherboard. Acer also integrates the disk controller into the motherboard, freeing an additional PCI slot. Acer's use of integrated components leaves it as expandable as servers that cost $3000 to $4000 more.

But the AcerAltos 9100 does not strive for tip-top performance with its PII-300 processors, slow-bus 66-MHz LX motherboard, EDO DRAM memory DIMMs (instead of faster SDRAM memory), and hard drives that spin at 7200 rpm—leisurely by the standards of higher-end servers.

Acer supplies a good setup software bundle to help novices install an OS, troubleshoot ▶

Fast, Faster, Fastest

It takes more than a fast processor to ace our three server benchmark tests.

Like surprises? We found some when we ran these seven servers through a series of new tests (see "How We Test Server Performance").

The biggest surprise came in the file service benchmark tests. Compaq's ProLiant 1600 scampered through them almost twice as fast as the others—an advantage we've rarely seen in server testing. We reran the tests several times, and confirmed the results with other measurements. Bluecurve (the maker of the testing suite we used) also validated our approach.

The ProLiant's superlative performance stems from a combination of top-of-the-line hardware, a unique memory architecture, and some impressive tweaking of the entire storage subsystem.

The seven servers were much more competitive in the Web service tests. Micron's NetFrame LV2000 squeaked ahead of the AcerAltos 9100, followed by the ProLiant 1600 and the Gateway ALR 8200. Contrary to our expectation that tests taxing memory performance and network adapter design would favor 400-MHz machines, the PII-300 servers were surprisingly fast.

But in the SQL/database service tests (which burden the CPU more than anything else), PII-400s dominated the top rung, as we expected.

WORKGROUP SERVERS — TEST REPORT

Compaq Serves Up Files Twice as Fast as Its Competitors

SERVER	Normalized rating[1]	File service (packets/sec.) ◀ Slower Faster ▶	Web service (bytes/sec.) ◀ Slower Faster ▶	SQL (transactions/sec.) ◀ Slower Faster ▶
Acer AcerAltos 9100	68	1154	390,672	438
Compaq ProLiant 1600*	89	2184	359,910	499
Dell PowerEdge 2300	72	1155	345,302	486
Gateway ALR 8200	78	1048	357,352	506
HP NetServer LH3	74	1047	342,521	502
Micron NetFrame LV2000	76	951	397,503	473
NEC Express5800 LS2400	67	1032	325,611	485
		Test weighting 30 percent	Test weighting 30 percent	Test weighting 40 percent

*Best Buy

TEST PC WORLD CENTER

[1]For more information on normalized ratings, see "How We Test Server Performance."

HOW WE TEST A complete description of our server testing methods is provided on page 206.

ILLUSTRATION: DAN PICASSO

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— Director of PointCast Networks, PointCast, Inc.

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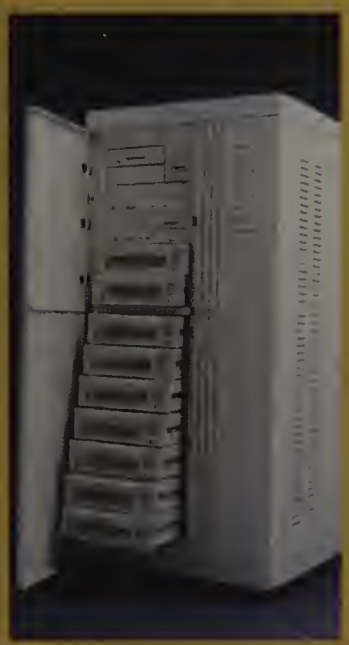

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- 512Kb Cache- Upgradeable to 4 CPUs
- 128MB ECC Memory, Expand to 4GB
- Slots: (7) PCI, (1) ISA
- Integrated 2MB Video
- Integrated Dual Ultra 2 LVD SCSI Controllers
- Q:(1) 18GB LVD 10,000RPM (5.0ms) Remov. HD
- I20 Ready
- Raid Upgradeable
- EMP Port for Remote Server Management
- Server Management System On Board
- 32x CD-ROM; Keyboard, Floppy
- 6 Bay 420 Watt Redundant Power Supply

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STF DUAL SLOT 2 XEON 400MHZ RAID 5

- 1 Intel Xeon 400Mhz Processor
- 512 KB Cache, Upgradeable to 2 CPUs
- 128MB ECC Memory, Expandable to 2GB
- Slots: (6) PCI, (1) ISA, (1) AGP
- Integrated 10/100 Ethernet
- 8MB AGP Video
- 3 Channel LVD Raid 5 Controller w/ 32MB Cache
- Q:(3) 18GB 10,000RPM LVD (5.0ms) Remov. HD
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STA DUAL SLOT 2 XEON 400MHZ

- Q:(1) Intel Slot 2 XEON 400Mhz Processor
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- 128MB SDRAM Expandable to 2GB
- Slots: (6) PCI, (1) ISA, (1) AGP

Integrated:

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- #9 Revolution 4 32MB AGP
- Q:(1) 9GB 10,000LVD 10,000RPM (5.0ms) Removable HD
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- Integrated Dual LVD Controllers
- Single Channel LVD Raid Controller
- Q:(3) 9GB 10,000RPM LVD (5.0ms) Removable HD
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problems, and maintain the machine from a remote site. The Acer StartUp EasyInstall kit automates installation of SCO OpenServer (a flavor of UNIX) and Novell NetWare 4.11; but somewhat inexplicably, it won't help you install Windows NT Server. Remote Diagnostic Manager allows you to perform diagnostics, reboot the server, change BIOS setup information, and set automatic server reboots from another computer using a phone line and modem. Finally, Acer includes Advanced Server Manager Pro, a utility that monitors the server's temperature, case fan, system voltages, and RAM.

COMPAQ PROLIANT 1600

Compaq's ProLiant 1600 is a fast system that offers expansion, power, and serviceability—in short, a lot of server bang—for a relatively modest outlay of bucks. This $7497 server for small- to medium-size businesses or departments is simple to manage, maintain, and repair, too. Its case design permits an administrator to painlessly disassemble the server into easily replaceable modules.

The ProLiant 1600 comes with dual PII-400s and a dual-channel SCSI-3 disk controller. The quartet of hot-swappable 4.3GB Seagate Cheetah hard drives spin at 10,000 rpm—the fastest speed SCSI hard disks can currently sustain. The ProLiant we looked at did not include Compaq's optional RAID card, but that didn't seem to hurt its performance. Other tests have shown that today's RAID cards often are designed more for redundancy protection than performance enhancement.

The ProLiant 1600 dominated our file tests, thanks to state-of-the-art hardware and some very clever performance tweaking.

The 1600 dominated the file service tests, completing these tasks twice as fast as its rivals, thanks to state-of-the-art memory and disk controller hardware plus some very clever performance tweaking. The ProLiant 1600 was also the third-fastest database and Web server. But the decisive factor in our ranking the ProLiant first for overall performance was its truly stunning file service scores.

Compaq bundles a pair of utilities—Smart Start and Insight Manager—to help administrators set up and maintain the server. Smart Start uses wizardlike menus to automate configuration of the server and help load its operating system quickly. Insight Manager monitors components and can anticipate when a component is about to fail. If Insight Manager warns of an impending hardware failure in your server, you can call Compaq for a replacement before the part burns out. The three-year warranty covers hardware that Insight Manager claims is about to fail, in addition to parts that break down without warning.

DELL POWEREDGE 2300

At $8639, the PowerEdge 2300 offers good features and reasonable performance for a workgroup-class server.

Dell engineered the server to make ▶

Servers may look like large PCs, but their specialized components work together to maximize performance and minimize downtime.

PROCESSOR AND RAM

A POTENT PROCESSORS–Minimum CPU: PII-333; $400 more for a PII-400.

B OODLES OF MEMORY–128MB minimum; ECC (error-correcting code) memory costs $200 to $300 more than standard 128MB SDRAM memory DIMMs.

STORAGE

C HIGH-SPEED HARD DRIVES–10,000-rpm SCSI drives are the fastest available. Capacities of 4.5GB (about $400) and 9GB (about $800 to $900) are standard.

D RAID CONTROLLER–A RAID (Redundant Array of Independent Disks) controller with 4MB to 32MB of cache ($900 to $1500) offers data loss protection.

E TAPE BACKUP–SCSI tape backup drives vary in cost from $1500 to $7000.

RELIABILITY AND EXPANDABILITY

F HOT-SWAP DRIVES–For $100 per bay, you can replace bad drives and stay online.

G NETWORK INTERFACE CARDS–A redundant NIC card costs $200.

H HEAVY-DUTY POWER SUPPLIES–Dual supplies sell for $800 to $1000; dual hot-swap supplies cost about $1200.

I SENSORS–Temperature and condition sensors can alert administrators to problems early on.

J BIG CASE–Built for high expandability, the cases are large enough to fit redundant and hot-swappable components like hard drives and power supplies.

What Makes a GREAT Server?

—Stan Miastkowski

ILLUSTRATION: K. DANIEL CLARK

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John Bass of Centennial Networking Labs ran our tests. With multiple high-speed drives spinning away, he says, the servers sounded "like a thousand tumbling BBs."

its components unusually easy to add or remove. You can replace any component without picking up a single tool. Our testing analysts liked Dell's tool-free design: It uses hot-swap bays for all the hard drives, thumbscrews for securing processors to the motherboard (and for closing the case), and plastic flip tabs for attaching PCI expansion cards to the system. No screwdriver is necessary.

The PowerEdge provides lots of room for expansion: Integrating the disk controller onto the motherboard left an additional PCI slot free, and using a single 128MB memory card left three SDRAM memory slots open.

Like the Compaq ProLiant, we tested the PowerEdge with dual PII-400 CPUs and four 10,000-rpm Seagate Cheetah hard drives. But Dell supplements its disk controller with the PowerEdge Expandable RAID Controller, a dual-channel card with a 32MB cache—the largest cache of any RAID controller in the review. Having a roomy cache can improve a RAID card's performance.

But despite its hardware muscle—and a fairly impressive second-place finish in our file service tests—the PowerEdge ranks fifth for overall performance. It came in fifth on the more heavily weighted Web service tests and fourth on the SQL/database tests.

Dell's OpenManage tool includes Server Console (to manage the server from another PowerEdge system); Client Administrator (to monitor and check the status of desktop systems on the network); Hardware Instrumentation Pack (to manage Windows NT and NetWare servers); and Remote Assistant (to manage the server from another location). Dell doesn't include an application to install and configure the network operating system; instead, the PowerEdge ships with the NOS preinstalled.

GATEWAY ALR 8200

Gateway's pricey ALR 8200 is a strong server with a roomy interior. It turned in the best performance in our SQL/database tests (506 transactions per second) and earned second place for overall performance. But the $11,319 price tag is rather high; the system is difficult to service; and it omits some management features that come standard in other systems.

Though the ALR 8200's case has eight expansion slots for future upgrades, its hard drive storage was nearly maxed out. Our test system had four hot-swappable 9.1GB Seagate Cheetah hard drives (and could accept two more fixed hard drives). For the price, you'd expect to get far more storage, but your only option is to connect an optional RAID cage (increasing the number of internal hot-swap bays in the system to 12) through the fixed drive bays.

The Gateway falls short in management features. Gateway's InfoManager software monitors fewer environmental factors than do other management software packages; the variables covered include system voltages, fan speeds, and ambient temperature in the room where the server is located. A remote access card—standard issue on several servers in the same price range—costs extra on the ALR 8200. Most important, InfoManager lacks any "hooks" to enterprise network management platforms, so it's not ideal for a large network composed of many servers.

HEWLETT-PACKARD NETSERVER LH3

Even system administrators accustomed to seeing expensive servers may experience sticker shock at the HP NetServer LH3's $13,566 price. And despite its costly hardware, the PII-400–based server outshines other machines only in the database tests, where it finished a close second to Gateway's ALR 8200. In the file and Web service tests, the LH3 came in fifth and sixth, respectively. Overall, the LH3 placed fourth in performance. Still, for a medium or large business that needs high reliability, fast database performance, easy manageability, and lots of expansion or upgrade room, the LH3 is a good choice.

The size and weight of a small refrigerator, HP's LH3 has plenty of space for internal components and sports an outstanding case configuration. The case can hold up to 12 hot-swap hard drives (ours contained four 4.3GB Seagate Cheetah drives).

The LH3, like Gateway's ALR 8200, has a total of eight expansion slots, seven of them free—the most we saw in this batch of servers. An integrated dual-channel drive controller and RAID array controller keeps two PCI slots open for other cards you might want to add later.

The LH3 comes with a good selection of management software, too, including HP Navigator, a network OS installation tool; TopTools, a server hardware monitoring utility; and ManageX, which coordinates TopTools data to help you manage and maintain the server.

MICRON NETFRAME LV2000

The NetFrame LV2000 is among the most affordable servers we tested. At $5897, it costs $1522 more than the AcerAltos ▶

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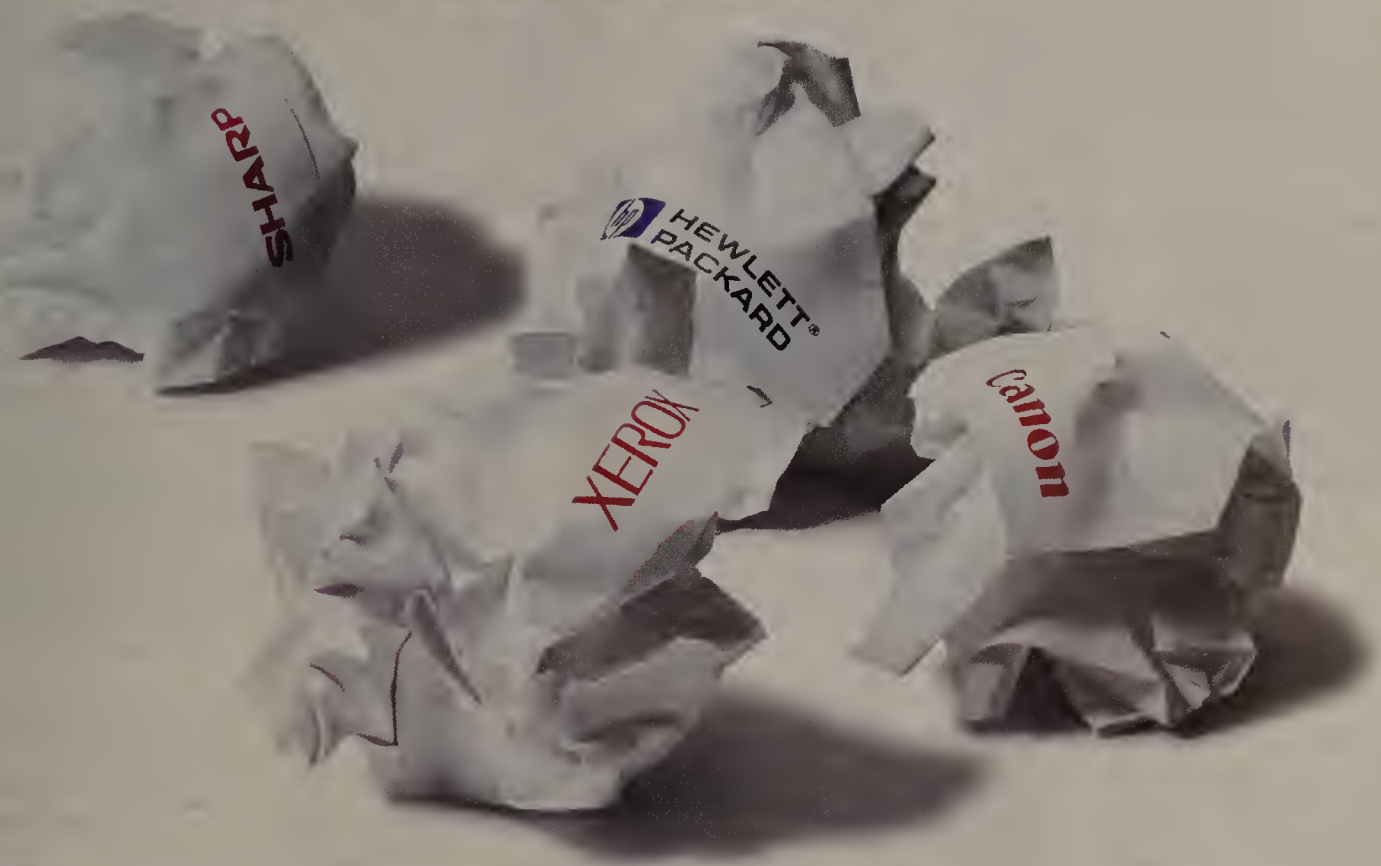

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9100 but $1600 less than next-cheapest server, Compaq's ProLiant 1600. Its low price and top performance in our Web service benchmark tests mean the LV2000 is most suitable as a Web server for a small business with a permanent Internet connection. Caveat emptor: Micron achieves its low price at the expense of serviceability features found in other servers.

Indeed, the PII-300–based LV2000 outran all others—especially the costlier PII-400 servers—on our Web service tests. But the Micron's scores on the SQL/database tests were near the bottom, and it lagged at the rear on the file server tests. Overall, the LV2000 finishes third, a position bolstered by its excellent Web performance. If having a low-cost Web server is your top priority, and you can do without redundancy, you'll appreciate the LV2000.

The server's design is its greatest drawback. The unit we evaluated lacked removable modules, hinged covers, and optional hot-swap hard drive bays. To replace a broken component, you'll spend an inordinate amount of time removing other parts first.

The NetFrame LV2000's storage subsystem includes an integrated Adaptec 7880 Wide-Ultra SCSI drive controller and an Adaptec RAID controller on a PCI card. (It costs less not to integrate the RAID controller onto the motherboard.) The server's four Western Digital Enterprise hard drives spin at 7200 rpm—a fast rotational speed by desktop standards, but much slower than the 10,000 rpm rate of the performance-boosting Seagate Cheetah drives we saw on most other servers.

Fortunately, a respectable bundle of software utilities accompanies the NetFrame LV2000 server. Intel's widely adopted LANDesk Server Manager monitors components and can reboot the system automatically if the server hangs or crashes. The Intel Country Kit CD-ROM installs the OS software and helps you configure the system.

NEC EXPRESS5800 LS2400

Sluggish performance and limited room for expansion mar the NEC Express5800 LS2400. Though this $8562 server includes dual PII-400 processors, it dragged through all three benchmark tests, finishing second to last and last in the file and Web server tests, respectively. Missing many key components of the speed-boosting hardware found in the other servers, it's little wonder NEC's Express5800 LS2400 ran like a ground sloth.

NEC's decision to use EDO DRAM in place of speedier SDRAM memory chips may have slowed it down. And its use of relatively slow (7200 rpm) hard drives may have played a role in the server's poor storage subsystem performance.

Like Micron's NetFrame LV2000, the LS2400's simple midtower case lacks convenient serviceability features. But unlike the NetFrame, the LS2400 costs almost as much as fuller-featured servers. The LS2400's case resembles a run-of-the-mill PC's: no hinged covers, removable drives, or slide-out components. Furthermore, you can't replace the fixed-position drive bays with optional hot-swap bays.

The only redundancy you can build into the LS2400 is a second network interface card. In the end, practically any repair job will take longer to perform on this system than it would on any of the other servers, so we can't recommended that you use it for mission-critical functions.

NEC bundles a pair of management utilities with the Express5800 LS-2400: ExpressBuilder installs and configures the NOS after you answer a few questions, and the ESMPRO application lets you monitor and configure server subsystems and monitor their performance. ESMPRO also allows you to perform server maintenance functions from any computer using a Web browser.

ILLUSTRATION: DAN PICASSO

HOW WE TEST

Server Performance

We tested the servers at Centennial Networking Labs, an independent hardware testing facility affiliated with North Carolina State University in Research Triangle Park, just outside Raleigh, North Carolina.

The tests used to evaluate the seven servers involve common server tasks: serving files, answering requests for information from a database, and serving up Web pages and graphics.

The file service tests put the most stress on the servers' hard drives and disk controllers; the database tests force the CPU to work as hard as possible; and the Web tests exercise the servers' memory architecture and network interface cards.

Each server is put through this triathlon with the aid of three commercial software tools that simulate real-world conditions: Bluecurve's Dynameasure File Professional 2.0 and Dynameasure SQL Professional 2.0 for the file and database tests; and Mercury Interactive's LoadRunner to test the servers' ability to feed Web pages to a data-hungry Internet.

In calculating overall performance, we gave the tests almost equal weight: File and Web service each counted for 30 percent of the overall score, and SQL/database performance counted for 40 percent of the final score.

online

For an analysis of Windows NT Server 5 and NetWare 5, visit PC World Online at www.pcworld.com/oct98/servers. John Bass is a senior technical staff member at Centennial Networking Labs. Testing was performed at CNL by John Bass and Anthony Grieco, in association with Network World, *where many of the results first appeared. Stan Miastkowski is a contributing editor for* PC World. *Dave Kearns is a networking consultant in Austin, Texas.* ■

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A monthly update of the best desktop PCs, notebooks, printers, monitors, graphics boards, and modems

PC WORLD

TOP 100

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PENTIUM II-400s:

A Shift in Power

EDITED BY MICHAEL DESMOND
AND CAMERON HEFFERNAN

MANAGED POWER: The IBM PC 300PL delivers corporate-minded PII-400 performance.

THE POPULAR REFRAIN is fast becoming a mantra: *better, faster, cheaper.* That's good news for PC buyers, but it's also likely to induce some anxiety. Prices are dropping so fast that the 400-MHz Pentium II you're ogling today could cost $250 less next month. Then again, the deals on top-flight systems are good right now—and waiting a month could easily cost you $250 in lost productivity.

What's driving the price slashes? For starters, with Intel's 450-MHz CPUs coming down the pike (see "Double Feature," page 55), the chip giant can no longer charge vendors a premium for Pentium II-400s, and PC prices across the board have dropped accordingly. That's why 15 PII-400s appear on the power chart this month. But downward pressure isn't coming exclusively from Intel's 450-MHz chips. New CPUs like the K6-2-300 from AMD are keeping Intel on its toes as well. Indeed, the AMD-powered Micro Express MicroFlex-K6/300A costs just $1199, yet this midtower is stocked with 64MB of RAM, a 17-inch monitor, and a DVD-ROM drive. With performance comparable to a typical PII-300 PC, the K6/300A earns a budget desktop Best Buy this month, placing fifth. No wonder Intel has cut prices on its Pentium II processors twice in as many months.

Intel's been lowering prices so furiously that we had to join the fray: This month we dropped the price ceiling for budget systems from $2250 to $2000. The adjustment reflects the steep drop in PC prices over the past few months. The average PII-400 dipped toward $2500—with three models selling for less than $2000. The price cuts are affecting the budget chart as well—a typical PII-300 desktop retailed for $2829 in April, but costs just $1895 today.

LAN SLIDE

IN THE FACE OF ALL the price cuts, PC vendors have been loading up their machines with additional features to distinguish them from the competition. The latest rage: networking capabilities. This month alone, four new network-equipped systems rolled through our doors, three of which landed on the power list: the Micron ClientPro 400, IBM PC 300PL, and the Acma ZPower 7400 PII400. All include quick 100-megabits-per-second PCI-based ethernet cards and management features like Intel LANDesk software. Support for key standards, like the Desktop Management Interface and the Advanced Configuration and Power Interface, means that you can boot systems from across a network or provide continuous low-power operation for fast and effective remote access.

Will a LAN-savvy, manageable system cost you extra? You bet. The average price for all PII-400s tested to date is $2545, while the typical managed PII-400 runs $2737, a premium of nearly $200. But the additional cost can save you bundles of time and money in the long run, and includes the network card itself (typically a $100 expense).

Leading the network charge this month is the $2798 IBM PC 300PL, which offers a slim desktop chassis that is short on expandability but long on management features. Alert-on-LAN warns of unauthorized intrusions into the system case, while internal thermal monitoring and hard disk analysis help prevent costly crashes. Performance is outstanding, with a PC WorldBench 98 score of 207. Micron's Windows NT-based ClientPro 400 costs $2823 and offers similar features in a roomier midtower. You also get 128MB of RAM—welcome in an NT 4.0 system—but performance was subpar for a PII-400. Acma's $2795 ZPower 7400 PII400 costs the least of the three, yet offers a large 14.4GB hard disk, an internal Iomega Zip drive, and a 56-kilobits-per-second x2-compatible modem.

We lowered the price ceiling for budget systems from $2250 to $2000 to reflect the steep drops

WHY INTEL? Micro Express's MicroFlex-K6/300A, powered by the AMD K6-2-300 CPU, performs like a PII-300 system.

LEND, LEASE, OR BUY?

TAKING A CUE from carmakers, some PC vendors are touting leases as protection against aging hardware. With a lease, the vendor owns the PC; you pay for the right to use it. After the lease term—typically 24 to 48 months—you may return the system to the vendor, buy the system at additional cost, or extend the lease to acquire new hardware. Not only does this make it practical to periodically refresh your hardware and avoid obsolescence—at least for a while—it also provides a way to get rid of that old PC.

But keeping your hardware current comes at a cost, of course. An earlier *PC World* investigation into these programs showed that leasing is not such a good idea for nonbusiness buyers (see March issue's *Consumer Watch,* "Look Before You Lease"). The monthly payments generally match or exceed those you would incur if you carried the debt on a credit card, and at the end of the term you must shell out hundreds of dollars more to keep the system. Extend the lease with new

hardware, and you face more payments. Nevertheless, leases are a tempting option because they cut up-front expenses without placing a burden on your credit card. Otherwise, the benefits to consumers are few. Home- and small-office buyers do, however, enjoy a tax benefit from a lease, since they can deduct the monthly payments from their taxes.

Gateway offers a new twist with its YourWare program, launched at the end of May. Essentially given a line of credit, users sidestep up-front costs by making monthly payments over a two- to four-year term. Unlike lessees, YourWare customers own the PC and may sell it back to Gateway at wholesale market price. They can then pocket the cash, apply the money to a new YourWare purchase, or keep their existing PC. In all cases, they may

prompted by Intel price cuts.

extend their YourWare credit line to a new purchase, getting the same obsolescence protection touted by lease programs.

As with leases, you end up paying more through YourWare than you would with an outright purchase. And many credit cards can beat YourWare's optimum 14.9 percent interest rate. Still, YourWare offers the advantages of a lease while paying you at the end of the term. You can also make incremental purchases from Gateway by requesting additional credit to your line—something that many leases won't allow.

PRINTS CHARMING

ARE YOU LOOKING to improve your image—on paper, that is? Then check out the NEC SuperScript 870, which replaces the Minolta PageWorks 6L on top of our monochrome personal printer chart. Faster and easier to use than the older SuperScript 860, the 870 offers a compact footprint and an even more compact price—$349. The printer produces good text quality (though graphics are a bit dark) and includes handy features like the ability to optimize output for photocopies. You'll also find two new Canon printers on the color list: The number three BJC-4400 and the number five BJC-5000.

NICE PRINTS: NEC's SuperScript 870 gives you quality monochrome images at a competitive price.

On the graphics board front, we are at last seeing the long-awaited Matrox G200 boards. Our tests show that the latest chips provide outstanding 2D performance while significantly improving the 3D capabilities offered by previous Matrox boards. The Matrox Millennium G200 grabs our number one Best Buy slot for AGP boards this month.

Michael Desmond is a senior associate editor and Cameron Heffernan an associate editor for PC World. *Senior Associate Editors Vince Bielski, Bryan Hastings, and Karen Silver; Staff Editor Grace Aquino; Assistant Editor Mick Lockey; Editorial Assistant Kalai Murugesan; and freelance writers Nancy Canning, Jim Martin, and JoAnne Robb contributed to the Top 100. Testing for the Top 100 was performed by Ulrike Diehlmann, Robert James, Elliott Kirschling, Jeffrey Kuta, Nancy Miller, and Mike Salayko of the PC World Test Center.* *See page 14 for contact information.* ▶

YOUR GUIDE TO THE TOP 100

QUESTIONS ABOUT OUR CHARTS? The following section should answer most of them.

How do the charts work? The Top 20 and Top 10 charts are evolving lists of the best PCs, monitors, modems, printers, and graphics boards we've tested. System charts are divided by price. Power desktops cost $2000 or more; power notebooks cost $2750 or more. We compare new products to previously reviewed hardware, updating the charts to reflect price cuts and other changes.

Where do you get your prices? We estimate street prices based on vendor information and our own research, including surveys of retail outlets. We recheck all prices every month.

What does the overall rating mean? This 100-point scale reflects results from our hands-on evaluations and performance tests. A score in the 90s is exceptional, while one in the 80s is among the best and one in the 70s above average.

What does the PC WorldBench 98 score mean? It's a measure of how fast a PC is in relation to our baseline machine, a Gateway PMMX-200 configured with 32MB of RAM, a 2GB hard drive, and 512KB of secondary cache. A PC that scores 200, for instance, is twice as fast as the baseline system.

Where do the scores for reliability, support quality, and support policies come from? Reliability and support quality scores are based on surveys of *PC World* readers and anonymous support calls made by *PC World* staff. The policies score is based on vendor support policies.

What do all those word scores mean? Word scores for performance and price are based on a product's rating in relation to other products in its category. For instance, we score the performance of Windows NT PCs separately from that of Windows 95 machines. (Based on our PC WorldBench 98 tests, Windows NT machines are faster on average than Win 95 PCs.)

Check out *PC World*'s Top 400 reviews online. Go to PC World Online (www.pcworld.com/hardware/top400) to explore our Top 400, which provides comprehensive reviews and ratings for products in 16 categories. You'll also find reviews not available in print.

PC WORLD

TOP 20 POWER DESKTOPS

	SYSTEM	Last month	Month tested	Street price (7/15/98)	CPU	Comments
1	Micron Millennia 400 888/634-8799 www.micronpc.com	1	July 98	$2648	Pentium II-400	Slight price increase doesn't hurt fastest Windows 95 PC.
2	Gateway GP6-400 800/846-2000 www.gateway.com	2	July 98	$2464	Pentium II-400	PII-400 offers network card, Zip drive, above-average performance.
3	Micron Millennia 350 888/634-8799 www.micronpc.com	3	July 98	$2299	Pentium II-350	Impressive PII-350 with 10GB hard drive.
4	Quantex QP6/400 SM-3x 800/896-4898 www.quantex.com	n/a	NEW	$2249	Pentium II-400	Affordable PII-400 includes Zip drive, nice-looking monitor, great support policies.
5	Dell Dimension XPS R400 800/388-8542 www.dell.com	6	July 98	$2699	Pentium II-400	$300 price cut helps loaded, DVD-equipped PII-400 edge into a Best Buy.
6	NEC Direction SP B400 888/863-2669 www.necnow.com	10	Aug 98	$2247	Pentium II-400	$51 off fast system with a 11.5GB hard drive; good response to our tech calls.
7	Dell OptiPlex GX1 400 800/289-3355 www.dell.com	5	Aug 98	$2884	Pentium II-400	Powerful corporate desktop's modular design makes upgrades easy.
8	Compaq Deskpro EP Model 6400X/6400/CDS 800/345-1518 www.compaq.com	7	July 98	$2561	Pentium II-400	Corporate speedster has network and management features, convertible case.
9	IBM PC 300PL 800/426-2968 www.ibm.com/pc/us/desktop	n/a	NEW	$2798	Pentium II-400	Slick client management features in network-equipped desktop; cramped interior.
10	Dell Dimension XPS R350 800/388-8542 www.dell.com	8	July 98	$2579	Pentium II-350	Slower, slightly cheaper sibling of R400 gets $250 discount.
11	Quantex QP6/400 SM-4x SE 800/896-4898 www.quantex.com	n/a	NEW	$2899	Pentium II-400	Loaded but pricey PC has huge monitor, DVD and Zip drives, 128MB of RAM.
12	Micron ClientPro 400 888/634-8799 www.micronpc.com	n/a	NEW	$2823	Pentium II-400	Network-ready NT midtower offers terrific configuration.
13	Gateway G6-333b 800/846-2000 www.gateway.com	n/a	NEW	$2297	Pentium II-333	PII-350-like performer has DVD-ROM and Zip drives, poor monitor.
14	Gateway E-4200 400 800/779-2000 www.gateway.com	9	Sept 98	$2823	Pentium II-400	Corporate PC with the works: network card, management, great support.
15	HP Vectra VL Series 8 800/322-4772 www.hp.com	11	July 98	$2750	Pentium II-400	Easy-access design and great performance; labor warranty cut to one year.
16	MidWest Micro Office Pro 400 800/728-8582 www.mwmicro.com	n/a	NEW	$2769	Pentium II-400	Improved support hours, LS-120 drive; subpar graphics and speakers.
17	Acma ZPower 7400 PII400 800/786-6888 www.acma.com	n/a	NEW	$2795	Pentium II-400	Network-savvy midtower includes modem and 24-hour phone support.
18	NexTrend NexStar 409W 877/833-8833 www.nextrendpc.com	14	Sept 98	$2399	Pentium II-400	$240 price cut on generic PII-400 with short warranty; helpful tech support.
19	CyberMax PowerMax H3 800/437-4596 www.cybermaxpc.com	n/a	Aug 98	$2099	Pentium II-333	3D graphics powerhouse comes with 128MB of RAM.
20	Sys Technology Sys Performance Pro 300LA 800/613-9963 www.sys.com	n/a	May 98	$2090	Pentium II-300	Fast NT-based PII-300 with top components jumps over from budget chart.

Best Buy See features chart, page 214; test report, page 216.

n/a = not applicable

[1]A system's performance word score is relative to scores of other PCs running the same operating system. For more details see "Your Guide to the Top 100" on page 211 of the introduction to the *Top 100*.

SIX MORE PENTIUM II-400 PCs landed on the Power Desktops chart this month, leaving only five systems not based on that fast CPU. Eight of these 15 powerhouses come equipped with network cards and management software. A pair of PII-400s just missed our chart. CLR's Infinity PII-400 is affordable but turned in the slowest time of any PII-400 tested to date. The pricey Royal Computer Synergy 4000 ($2998) comes with 96MB of RAM and a 21-inch monitor, but bare-bones support policies and scant phone support hurt this workstation-class PC. We also tested the Micron ClientPro 266 and Gateway G6-300b, close siblings of the ClientPro 400 and G6-333b, but these machines fell short on performance.

SCORECARD

★ Overall rating	PC WorldBench 98/operating system	Performance	Features and design	Vendor's system reliability	Price	Vendor's support quality/policies	InfoNet number [2]
89	210/Win 95	outstanding	very good	above average	expensive	above average/best	641
86	204/Win 95	outstanding	outstanding	average	average	above average/best	642
86	194/Win 95	good	very good	above average	average	above average/best	643
86	198/Win 95	very good	outstanding	average	inexpensive	average/best	644
85	199/Win 95	very good	very good	above average	expensive	above average/best	645
84	207/Win 95	outstanding	very good	below average	inexpensive	average/good	646
84	244/Win NT 4.0	very good	very good	above average	very expensive	above average/best	647
84	200/Win 95	very good	very good	average	average	average/best	648
83	207/Win 95	outstanding	very good	average	expensive	average/good	–
83	187/Win 95	good	very good	above average	average	above average/best	649
82	200/Win 95	very good	outstanding	average	very expensive	average/best	650
82	228/Win NT 4.0	good	very good	above average	expensive	above average/best	651
81	183/Win 95	good	very good	average	average	above average/best	652
81	190/Win 95	good	outstanding	average	expensive	above average/best	653
79	207/Win 95	outstanding	very good	average	expensive	average/worst	654
78	199/Win 95	very good	very good	[3]	expensive	[3]/good	655
78	198/Win 95	very good	very good	[3]	expensive	[3]/best	656
77	196/Win 95	very good	very good	[3]	average	[3]/fair	657
76	171/Win 95	satisfactory	outstanding	[3]	inexpensive	[3]/best	658
76	213/Win NT 4.0	good	very good	[3]	inexpensive	[3]/good	659
Scorecard weightings ▶		Performance 25 percent	Features 25 percent	Reliability 15 percent	Price 15 percent	Quality/policies 10 percent each	

For more information about all products in this table, select InfoNet no. 903 or visit www.pcworld.com/infonet.
Insufficient data to give a rating.

This Month's Best Buys

1 MICRON MILLENNIA 400

PRO: Unrivaled speed, extensive support policies

CON: Uninspiring sound and monitor; quality of technical support may be slipping

Despite a $49 price increase from the month before, the Micron Millennia 400 again leads all power desktops. With a PC WorldBench 98 score of 210, this loaded PII-400 midtower provides unparalleled speed for a Win 95 PC.

The system itself is compelling. Its case features chiseled curves and molded slots for each internal drive (floppy, Iomega Zip, and slot-fed DVD-ROM). The back of the system offers user-friendly color-coded ports, while the case opens easily to reveal a tidy interior with plenty of open drive bays, card slots, and DIMM sockets.

Multimedia fans will welcome the second-generation DVD-ROM drive, though you won't find any titles for it in the box. An internal Iomega Zip drive and a fast 10GB hard disk give ample storage. Micron also throws in a 56-kilobits-per-second modem from 3Com and bundles Microsoft Office 97 Small Business Edition.

Micron Millennia 400

For a system designed around multimedia, the Millennia's monitor and sound are unimpressive. The Diamond Viper V330 AGP card delivers snappy graphics for business apps and 3D games, but the picture on our test PC's 17-inch display looked washed out and fuzzy along the edges. We liked the Altec Lansing AV390 speaker-subwoofer combo, but we had to push the volume before the bass kicked in.

Micron's documentation consists only of individual component manuals. Service and support policies are great, though, with a three-year parts and one-year labor warranty and 24-hour toll-free phone support.

One concern: Micron's historically superior tech support quality may be slipping. In our most recent calls, we endured long hold times, rushed service, and some off-the-mark answers.

2 GATEWAY GP6-400

PRO: Excellent performance, affordable for its class, great sound system, ethernet card

CON: Weak airflow, poor labeling

The $2464 Gateway GP6-400 is the do-everything PC for the networked home or office. With its above-average PII-400 performance (a PC WorldBench score of 204), beefy multimedia configuration, and bundled network card, the GP6-400 can take on almost any task. Add Gateway's superb support policies, and it's no wonder this PC is a Best Buy.

Gateway GP6-400

One thing you won't find in the GP6-400 is a modem. Instead, the 100-megabits-per-second SMC EtherPower II ▶

TOP 20 POWER DESKTOPS — STANDARD FEATURES

	SYSTEM	CPU	Operating system	RAM (MB)	Secondary cache (KB)	Hard drive (GB)	Graphics adapter (AGP)	Video RAM (MB/type)	Monitor tube/viewable diagonal (inches)	Modem speed (kbps)
1	Micron Millennia 400*	Pentium II-400	Windows 95	64	512	10	Diamond Viper V330	4/SGRAM	17/16	56 [2]
2	Gateway GP6-400*	Pentium II-400	Windows 95	64	512	10	STB Velocity 128	4/SGRAM	17/15.9	not included
3	Micron Millennia 350*	Pentium II-350	Windows 95	64	512	10	Diamond Viper V330	4/SGRAM	17/16	56 [2]
4	Quantex QP6/400 SM-3x*	Pentium II-400	Windows 95	64	512	8.1	Real 3D StarFighter	8/SGRAM	17/15.7	56 [3]
5	Dell Dimension XPS R400*	Pentium II-400	Windows 95	64	512	14.4	STB Nvidia Plus	4/SGRAM	17/15.8	56 [2]
6	NEC Direction SP B400	Pentium II-400	Windows 95	64	512	11.5	Diamond Viper V330	4/SGRAM	17/15.8	56 [2]
7	Dell OptiPlex GX1 400	Pentium II-400	Windows NT 4.0	64	512	6.4	integrated ATI 3D Rage Pro	8/SGRAM	17/15.9	not included
8	Compaq Deskpro EP Model 6400X/6400/CDS	Pentium II-400	Windows 95	64	512	6.4	Diamond Viper V330	4/SGRAM	17/16	56 [2]
9	IBM PC 300PL	Pentium II-400	Windows 95	64	512	9.1	Matrox Millennium II	8/WRAM	17/15.7	not included
10	Dell Dimension XPS R350	Pentium II-350	Windows 95	64	512	14.4	STB Nvidia Plus	4/SGRAM	17/15.8	56 [2]
11	Quantex QP6/400 SM-4x SE	Pentium II-400	Windows 95	128	512	11	Real 3D StarFighter	8/SGRAM	19/18	56 [3]
12	Micron ClientPro 400	Pentium II-400	Windows NT 4.0	128	512	6.4	Diamond Viper V330	4/SGRAM	17/16	not included
13	Gateway G6-333b	Pentium II-333	Windows 95	64	512	9.6	Chromatic Mpact	4/RDRAM	17/15.9	56 [2]
14	Gateway E-4200 400	Pentium II-400	Windows 95	128	512	10	ATI Xpert@Work	8/SGRAM	19/17.9	56 [2]
15	HP Vectra VL Series 8	Pentium II-400	Windows 95	64	512	10	Matrox Productiva G100	4/SGRAM	17/15.9	not included
16	MidWest Micro Office Pro 400	Pentium II-400	Windows 95	128	512	14.4	ATI Xpert@Play	8/SGRAM	17/15.7	56 [3]
17	Acma ZPower 7400 PII400	Pentium II-400	Windows 95	64	512	14.4	Real 3D StarFighter	8/SGRAM	17/16.1	56 [2]
18	NexTrend NexStar 409W	Pentium II-400	Windows 95	64	512	8.4	CardExpert Intel740	8/SGRAM	17/16.1	56 [2]
19	CyberMax PowerMax H3	Pentium II-333	Windows 95	128	512	8.4	Symmetric GlyderMax-2	8/SGRAM	19/18	56 [3]
20	Sys Technology Sys Performance Pro 300LA	Pentium II-300	Windows NT 4.0	64	512	6.4	Matrox Millennium II	8/WRAM	17/15.7	56 [2]

* Best Buy

[1] *PC World* defines towers as taller than 20 inches, midtowers as 15.5 inches to 20 inches, and minitowers as shorter than 15.5 inches.
[2] Downloads only, uploads at 33.6 kbps; uses 3Com/U.S. Robotics' x2 technology.

10/100 ethernet adapter handles all the connectivity duties and comes paired with Intel's LANDesk Client Manager software for configuring and maintaining your PC over the network. A 10GB hard disk, 13X–32X CD-ROM drive, and built-in Iomega Zip drive provide storage aplenty.

After hours, the GP6-400 doubles as a first-class entertainment system. Audio is outstanding: The Boston Acoustics MicroMedia System, consisting of a subwoofer and two palm-size satellite speakers, delivers terrific sound from high treble to low bass. The STB Velocity 128 AGP card works with a sharp EV700 17-inch monitor to supply knockout graphics, including accelerated 3D for games. Color-coded audio ports on the back of the system help to simplify setup.

While the GP6-400's case is attractive and easy to open, its curvy lines prevent you from resting external drives or disks on top. Gateway's documentation includes an entire volume on maintenance and troubleshooting, plus a diagnostic CD-ROM and manual. The bundled discs—among them, Microsoft's Office 97 SBE—are nicely organized in a compact binder instead of in separate jewel cases. Support policies are top-notch, including a three-year warranty on parts and labor, and toll-free technical support 24 hours a day. Our calls to tech support reps turned up accurate and courteous service—though we had a hard time reaching a rep the first time around.

Micron Millennia 350

3 MICRON MILLENNIA 350

PRO: Fast and loaded, extensive support policies
CON: So-so monitor, tech support may be slipping

Micron's Millennia 350 has a lot in common with its sibling, the top-rated Millennia 400. It offers leading performance for its CPU class and is a bargain at $2299. As mentioned in our write-up of the Millennia 400, we're a bit concerned about Micron's tech support quality these days. The answers we obtained from our anonymous calls were not as accurate or helpful as those we've received in the past.

With a PC WorldBench score of 194, this Millennia is fast for a PII-350 system, and only about 8 percent slower than the 400. If you're

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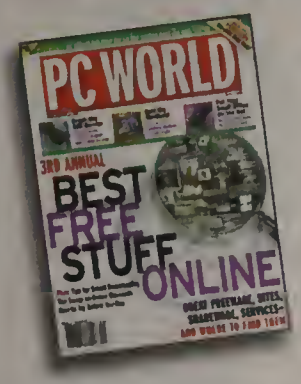

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CD/DVD-ROM drive speed	Sound board	Case style [1]	Max. RAM (MB)	Open RAM sockets	Open drive bays (ext./int.)	Open slots	Warranty for parts/labor (years)	Weekday toll-free support (hours)	Weekend support	Online support
2X DVD-ROM	integrated Crystal Audio	midtower	384	2	2/1	4	3/1	24	Sat., Sun.	BBS, CIS, WWW
13X-32X	Ensoniq AudioPCI	midtower	384	2	2/2	4	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
12X-32X	Integrated Crystal Audio	midtower	384	2	2/1	4	3/1	24	Sat., Sun.	BBS, CIS, WWW
12X-32X	Ensoniq AudioPCI	midtower	384	2	2/3	4	3/1	24	Sat., Sun.	BBS, WWW
2X DVD-ROM	Turtle Beach Montego	midtower	384	2	2/1	2	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
14X-32X	integrated Crystal Audio	midtower	384	2	3/0	4	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
14X-32X	integrated Crystal Audio	midtower	384	2	2/1	7	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
12X-24X	ESS ES1B69	desktop	384	2	1/1	4	3/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
12X-32X	integrated Crystal Audio	desktop	384	2	1/1	4	3/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
2X DVD-ROM	Turtle Beach Montego	midtower	384	2	2/1	2	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
2X DVD-ROM	Ensoniq AudioPCI	midtower	384	1	2/3	3	3/1	24	Sat., Sun.	BBS, WWW
20X-32X	integrated Crystal Audio	midtower	384	2	3/1	4	3/1	24	Sat., Sun.	BBS, CIS, WWW
2X DVD-ROM	integrated Ensoniq AudioPCI	midtower	384	1	2/2	3	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
13X-32X	Ensoniq AudioPCI	midtower	384	2	3/2	2	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
12X-32X	HP Audio (AZT 100B)	midtower	768	1	2/1	4	3/1	11	none	AOL, BBS, CIS, WWW
13X-32X	Ensoniq AudioPCI	midtower	384	2	3/1	4	varies [4]/3	24	Sat., Sun.	BBS, WWW
12X-32X	integrated Crystal Audio	midtower	384	2	0/1	3	3/1	24	Sat., Sun.	BBS, WWW
14X-32X	Sound Blaster AWE64	midtower	768	2	2/1	4	varies [5]/1	24	Sat., Sun.	WWW
14X-32X	Ensoniq AudioPCI	midtower	384	1	2/3	4	3/1	24	Sat., Sun.	BBS, WWW
12X-24X	Sound Blaster AWE64	midtower	1024	2	3/2	4	varies [6]/5	24	Sat., Sun.	WWW

[3] Downloads only, uploads at 33.6 kbps; uses Rockwell-Lucent's K56flex technology.
[4] Five years on CPU and main RAM, three years on other parts.
[5] One year on CPU, RAM, monitor, keyboard, and mouse; three years on other parts.
[6] Six years on CPU and main RAM, three years on other parts.

used to an older PC, the 350's performance is like trading in a pair of rusty metal roller skates for roller blades. The large 10-GB hard disk and Iomega Zip drive offer lots of storage, and we like the disc-loading mechanism on the trayless 12X–32X CD-ROM drive.

Whereas the Millennia 400 comes with Microsoft Office SBE, the 350 has the Audio Works Pro Studio sound-editing package. The 17-inch Micron display looked a bit fuzzy and slightly bowed in our tests—those who spend their days with their eyes glued to the screen might want something crisper. The Altec Lansing speaker system isn't bad once you crank it up, but the subwoofer sounds muddy at low volume.

The Millennia 350's off-white midtower case is sturdy and easy to open. Inside, a whisper-quiet fan blows air directly over the huge heat sink on the processor. The keyboard, while slightly spongy, is comfortable, as is the Microsoft IntelliMouse. Micron backs its systems with a standard three-year parts, one-year labor warranty, and offers around-the-clock support.

4 QUANTEX QP6/400 SM-3X

PRO: Inexpensive, has Iomega Zip drive, excellent technical support policies

CON: So-so software bundle, no system user guide

The $2249 QP6/400 SM-3x has a nice mix of solid business features at a relatively low price. With a PC WorldBench score of 198, the PII-400–based SM-3x is an average performer for this class of PC yet costs about $300 less than the typical PII-400 system. What's more, this beige midtower has a gee-whiz configuration to match its winning performance and price. The 100MB internal Zip drive provides easy backups, while the Altec Lansing ACS45 speaker and subwoofer offer some of the cleanest sound we've heard from a PC. The Real3D StarFighter AGP graphics card is top-flight, and we like the Quantex XP172 17-inch monitor, which produced sharp graphics and crisp-looking text.

Quantex QP6/400 SM-3x

Getting inside the case is simple (look, ma, no tools!), and you won't find cables or other obstructions between you and the four open card slots or five free drive ▶

bays. Quantex provides 24-hour toll-free tech support, which may come in handy since the system ships without a user guide—you'll have to make do with component manuals.

The QP6/400 SM-3x could use a better software bundle. Quantex includes utilities for your small or home office—from a label-making program to business applications—but you won't find a leading office suite. However, this is a small complaint about an overall great buy.

5 DELL DIMENSION XPS R400

PRO: Huge hard disk, good sound, Trinitron monitor, DVD-ROM and Zip drives

CON: A bit costlier than comparable PII-400s

Dell's Dimension XPS R400 reemerges as a power desktop Best Buy thanks to a $300 price cut.

Storage is the forte of the XPS R400: A speedy IBM Deskstar hard disk holds a whopping 14.4GB of data. (The XPS R400 is one of four Top 20 PCs with this giant drive.) A second-generation DVD-ROM drive ensures compatibility with the latest games and video titles. The internal Iomega Zip drive allows you to back up or share large data files easily.

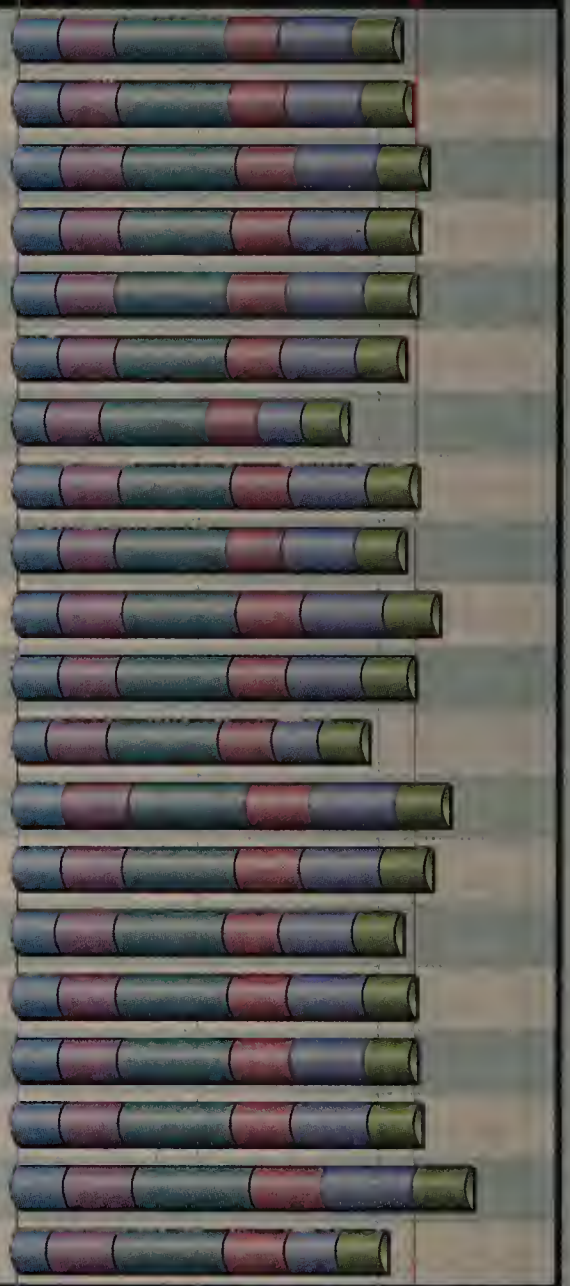
Dell Dimension XPS R400

The R400 also includes the 4MB STB Nvidia Plus AGP graphics card. The intuitive front-panel push-button controls on the crisp 17-inch Dell Trinitron moni- ▶

TOP 20 POWER DESKTOPS

TEST REPORT

	SYSTEM	CPU	Operating system	RAM (MB)	Secondary cache (KB)	PC WorldBench 98 score
1	Micron Millennia 400*	Pentium II-400	Win 95	64	512	210
2	Gateway GP6-400*	Pentium II-400	Win 95	64	512	204
3	Micron Millennia 350*	Pentium II-350	Win 95	64	512	194
4	Quantex QP6/400 SM-3x*	Pentium II-400	Win 95	64	512	198
5	Dell Dimension XPS R400*	Pentium II-400	Win 95	64	512	199
6	NEC Direction SP B400	Pentium II-400	Win 95	64	512	207
7	Dell OptiPlex GX1 400	Pentium II-400	Win NT 4.0	64	512	244
8	Compaq Deskpro EP Model 6400X/6400/CDS	Pentium II-400	Win 95	64	512	200
9	IBM PC 300PL	Pentium II-400	Win 95	64	512	207
10	Dell Dimension XPS R350	Pentium II-350	Win 95	64	512	187
11	Quantex QP6/400 SM-4x SE	Pentium II-400	Win 95	128	512	200
12	Micron ClientPro 400	Pentium II-400	Win NT 4.0	128	512	228
13	Gateway G6-333b	Pentium II-333	Win 95	64	512	183
14	Gateway E-4200 400	Pentium II-400	Win 95	128	512	190
15	HP Vectra VL Series 8	Pentium II-400	Win 95	64	512	207
16	MidWest Micro Office Pro 400	Pentium II-400	Win 95	128	512	199
17	Acma ZPower 7400 PII400	Pentium II-400	Win 95	64	512	198
18	NexTrend NexStar 409W	Pentium II-400	Win 95	64	512	196
19	CyberMax PowerMax H3	Pentium II-333	Win 95	128	512	171
20	Sys Technology Sys Performance Pro 300LA	Pentium II-300	Win NT 4.0	64	512	213



*Best Buy

Word 97 · Word Pro 97 · Excel 97 · 1-2-3 97 · Paradox 8.0 · Picture Publisher 7.0

TEST PC WORLD CENTER **HOW WE TEST** All systems are tested with PC WorldBench 98, *PC World*'s application-based benchmark. A higher PC World8ench score is better. All PCs are tested with either Windows 95 or Windows NT 4.0, and video resolution is set to 800 by 600 in 65,536 colors. We run automated scripts on six popular business applications, performing common tasks such as spelling checks, scrolls, saves, sorts, and recalculations. The PC WorldBench 98 score is a sum of the weighted, normalized result of each script: Word 97 (10 percent), Word Pro 97 (10 percent), Excel 97 (20 percent), 1-2-3 97 (20 percent), Paradox 8.0 (20 percent), and Picture Publisher 7.0 (20 percent). For more details on our benchmark and how we run it, see PC World Online (www.pcworld.com/testing). [1]Under Windows 95.

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tor are a welcome change from the confusing on-screen menus most high-end monitors use to adjust settings. The R400 even sounds good: An Altec Lansing ACS-295 speaker-and-subwoofer system is paired with a new Turtle Beach Montego sound card that delivers compelling surround-sound in Win 95–based games. The software bundle includes Microsoft's Office 97 SBE and Encarta 98, as well as McAfee VirusScan.

Inside the R400, we found a clean design and adequate expansion in the form of three free drive bays (two accessible from the front panel) and two open PCI slots. A 56-kbps modem occupies the lone ISA slot. The case is easy to open (provided you read the instructions first), but we found the Dell QuietKey keyboard a bit noisy.

Dell's useful guides and manuals should make setups quick and easy. The company's support policies are among the best: 24-hour toll-free tech support, and a three-year parts, one-year labor warranty. However, some of our readers have complained recently about long times spent on hold when calling Dell support.

New This Month

The following PCs made our Power Desktops chart for the first time this month. For original reviews of previously tested PCs on the chart, visit our Web page (www.pcworld.com/top400).

9 IBM PC 300PL

PRO: Extensive management features, sharp monitor, excellent performance

CON: Limited expandability, relatively expensive

The well-crafted IBM PC 300PL combines above-average performance for its class with excellent networking features, making it a welcome addition to any business. If only it had a more competitive price—at $2798, you're paying a lot of green for Big Blue.

This swift Win 95–based PC boasts a PC WorldBench score of 207 and a raft of cool features. From Wake on LAN and remote configuration capability, to a chassis intrusion system and thermal monitor that protect against tampering and overheating, the PC 300PL offers unmatched management talents. An IBM 10/100 Etherjet PCI card lets you plug immediately into an ethernet network.

Inside, you'll find an easy-out motherboard and flip-up power supply, but the interior itself is cramped.

IBM didn't compromise on features, either. These include a 9.1GB hard disk and 12X–32X CD-ROM drive. The 17-inch IBM monitor showcases a sharp display and intuitive controls.

IBM PC 300PL

IBM produces top-notch documentation. The company also offers extensive support, including toll-free technical support available around the clock, and a three-year warranty on parts (one year on labor).

11 QUANTEX QP6/400 SM-4X SE

PRO: Loaded configuration, great 19-inch monitor

CON: Expensive, no DVD drivers or titles

The SM-4x SE is Quantex's solution for the power user who wants everything—and isn't afraid to pay for it. At $2899, the SM-4x SE is pricey, but it has nearly every bell and whistle you could wish for, including a 19-inch monitor. Missing and mismatched components and drivers keep this system on the lower half of the chart.

This loaded, strong-performing midtower is crammed with 128MB of RAM, an 11GB hard disk, an Iomega Zip drive, and a 2X DVD-ROM drive. The Altec Lansing ACS490 Dolby Surround Sound three-piece speaker system will wow movie and game buffs, though the sound lacked clarity when outputting just music. The 19-inch Hitachi monitor dazzled us with its crisp graphics even at the far corners of the large screen.

So why isn't this PC riding the top of the chart? First, we prefer a graphics card that can handle 1600 by 1200 resolution. The 8MB Real3D StarFighter graphics card is a fine general-purpose 2D and 3D gaming accelerator, but it won't support the monitor's top resolution. We would also have liked a better keyboard than the squishy Legacy model we got. Also, Quantex failed to install drivers for the no-name 56-kbps modem, Microsoft IntelliMouse, and DVD-ROM drive—an irksome oversight for novices. Finally, no DVD titles were packed with the Microsoft Office 97 software bundle.

Quantex QP6/400 SM-4x SE

Loosening three thumb screws gets you inside the case, where you'll have to wade through criss-crossing cables to get to the five free drive bays and three free slots. Quantex's generally good manuals bear no mention of the DVD-ROM drive.

12 MICRON CLIENTPRO 400

PRO: Fast, easy-open case, network ready, crisp monitor, top-ranked reliability and service

CON: Relatively small hard drive, problems in our anonymous tech support calls

If you had a sweet, little old Southern grandmother who was hip to computers, she'd say the Micron ClientPro 400 offers "a gracious plenty" for corporate IS and small-business buyers alike. This Win NT 4.0 workhorse comes ready to network, with a preinstalled 3Com Etherlink LAN adapter card and Intel's remote control software for system monitoring. Power users will appreciate the 128MB of RAM, enough to handle demanding multitasking operations without going to slow disk-based virtual memory.

Micron ClientPro 400

But this well-built and attractive midtower's $2823 price may scare some people away. The ClientPro 400's performance also trailed the two other NT–based PII-400 desktops we've tested by about 7 percent. The 6.4GB hard disk is smaller than those found in most power systems, too. Finally, our calls to Micron's tech support this month entailed long hold times and inaccurate responses—a downturn for a firm that has typically provided top-notch customer service.

IS types will love the easy access to the PC's interior. On the front bezel, the externally accessible drive bays are tucked away behind a pop-off plastic cover. The chassis's curved contours give the ClientPro a sleek ▶

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appearance that's also sturdy. The 17-inch monitor offers crisp graphics and text, and is driven by the versatile Diamond Viper V330 AGP graphics adapter.

For small-business users, the ClientPro ships with Office 97 SBE and Norton Utilities. And Micron's service and support policies are what your Southern grandma might call "downright neighborly."

13 GATEWAY G6-333B

PRO: Great speed for PII-333, DVD-ROM drive

CON: Pricey for its class, washed-out monitor

Gateway refreshed its business-oriented line of PCs this month. We tested a pair of Gateway G6 systems: the identically configured G6-300b and G6-333b. Both deliver terrific performance for their processor classes, impressive multimedia components, and a host of business and multimedia software. But the $2297 G6-333b gets the nod over the $2049 G6-300b thanks to its superior performance at a still-reasonable price. The fastest Windows 95–based PII-333 we've ever tested with a PC WorldBench score of 183, the G6-333b nearly matches the average performance of PII-350 systems tested to date. Both Gateway models, however, are fine systems for your home or office.

With its 2X DVD-ROM drive and terrific Boston Acoustics BA635 satellite-with-subwoofer speaker set, the G6-333b could earn a place in your den as an entertainment center. And for those with work on their minds, Gateway comes with Microsoft Office SBE and Quicken Basic 98.

Gateway G6-333b

An internal Iomega Zip drive and 9.6GB hard disk give storage to spare, but the 17-inch Gateway EV700 monitor we reviewed produced fuzzy and washed-out images. Consider trading up to the Gateway VX700 monitor, though it will tack on about another $120 to the cost.

There's probably not much you'll want to add to the inside of the G6-333b for a while, but once you do, a well-designed interior makes the process simple. The curved case comes off easily to reveal four free drive bays and three open PCI slots. A modem hogs the lone ISA slot. Gateway's documentation is excellent, as are the company's long three-year parts and labor warranties and 24-hour tech support.

16 MIDWEST MICRO OFFICE PRO 400

PRO: LS-120 storage drive and large hard drive

CON: Some aging or lower-quality parts, no software bundle, relatively expensive

We expect two things from new desktop PCs: flexibility and affordability. While the MidWest Micro Office Pro 400 is well configured, its $2769 price tag—about $200 more than a typical PII-400's—pulls down its chart ranking.

MidWest Micro Office Pro

The extra dollars do buy you a few bonuses, such as an internal LS-120 drive that reads and writes both native 120MB media and existing 1.44MB floppy diskettes. The 14.4GB hard disk is among the largest we've seen, and the 17-inch KD-7300 monitor produces reasonably crisp output. The on-screen controls for the monitor are simple to use. And the Pro 400's PC WorldBench score of 199 is quick by any standard.

But the supporting cast is less than stellar. The Labtec LCS2420 speakers sounded hollow and a bit tinny. And the aging ATI Xpert@Play graphics card doesn't provide the cutting edge 2D and 3D performance offered by newer boards based on the Intel740 or Nvidia Riva 128TNT chip. The PC also lacks business software.

At least upgrading is easy—you get two free DIMM slots, four open drive bays, and four free card slots. Given the Pro 400's lackluster user manual, you may need to call on MidWest Micro's round-the-clock, toll-free tech support. In our anonymous calls, we received courteous, knowledgeable, and prompt service.

17 ACMA ZPOWER 7400 PII400

PRO: Network card, Zip drive, 14.4GB hard disk

CON: Very limited expandability

IBM's PC 300PL may be the IS manager's desktop PC of choice, but corporate power users may find that the $2795 Acma ZPower 7400 PII400 has greater appeal because it delivers a more robust selection of hardware—including an ethernet network card, a 56K modem, an Iomega Zip drive, and a large 14.4GB hard disk—for a nearly identical price. Video is driven by the Real 3D StarFighter graphics board—a contender in our *Top 10 Graphics Boards* chart.

However, the ZPower 7400 PII400 lacks the management tools found in the IBM. The midtower case has only one internal drive bay open, though it does have four free add-in slots. With a PC WorldBench score of 198, the ZPower 7400 performed slightly behind the PII-400 curve—but not enough for most users to notice. The communications hardware is first rate: The network card is Intel's EtherExpress PCI adapter; a 3Com 56-kbps modem lets you ply the phone lines. We also like the 17-inch monitor, which produced sharp graphics. But the monitor controls require you to spin a hard-to-reach dial under the bezel.

The Mli-130 speakers were also a letdown. Bulky and designed to be angled upward, the speakers take up a lot of desk space. Audio quality is poor, with output that sounded muted and dull.

Acma ZPower 7400

Acma's documentation is good. The company offers a three-year parts, one-year labor warranty, and recently updated its support hours to 24 hours per day, weekends included. Acma's technical support personnel were responsive and courteous, though they flubbed our easiest question. ▶

BEYOND THE TOP 20

online

We evaluated the following systems along with the others, but they didn't score high enough to reach the Top 20 Power Desktops chart. For write-ups, see PC World Online (www.pcworld.com/t20pcs).

- **CLR Infinity PII-400**
- **Gateway G6-300b**
- **Micron ClientPro 266**
- **NextPC N6-350**
- **Royal Computer Synergy 4000**

WITH QUALITY UP AND PRICES DOWN, MONITORS HAVE NEVER LOOKED BETTER.

So how do you find one that looks right for you?

In the world of peripherals, computer monitors boast an uncommonly long life span. While modems, scanners, and storage are quickly rendered obsolete by the next "big thing," displays stand alone with stable core technologies that enable longevity. Which means that the monitor you purchase today could last you well into the next decade. Recognizing this fact, some manufacturers are responding with more specialized product offerings that give different end-user categories a broad choice of feature sets and pricing to meet their unique needs. As a result, there have never been more options.

What kind of user are you?

Savvy buyers—and even many novices—are no longer satisfied with just any old monitor. Since they may be living with it for a long time, they are closely examining the monitor that might come bundled with their system to see if it's right for their needs. More than ever, it's important to choose wisely. The key to doing that is first recognizing the kind of user you are.

Three classes of monitor users.

Quality is graded by the level of clarity, brightness, and contrast that a monitor generates and how that level satisfies the requirements of these user classes:

- Entry-level
- Performance
- Professional

Identifying you or your company's user level and matching it to a monitor's capabilities will make the selection easier and help you get the most value from your purchase.

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If your profile matches that of the Entry-level user, look into one of the five models that make up Mitsubishi's Diamond Scan line, such as the Diamond Scan 90e shown here.

Entry-level.

Entry-level users shop for value. Users in this class are newcomers to computing, small office/home office entrepreneurs, game players, and people who use their computer primarily for going online and e-mail. Mitsubishi Electronics developed its Diamond Scan line of 15 - 19″ (13.8 - 18.0″ diagonal viewable area) displays for this class. Because price is paramount, Mitsubishi's Diamond Scan line utilizes more affordable shadow mask technology — in contrast to aperture grille — to control the path of electron beams to the phosphors. And since the applications favored by Entry-level users are less graphically driven, shadow mask provides appropriate brightness and clarity for their purposes.

Corporate users looking for affordable displays that don't sacrifice performance select a monitor like the Diamond Plus 100e shown here.

Performance.

Experienced users are more concerned with performance. While cost does matter, they're looking for the very best technology that their budget can handle. Performance users — most often in corporate America — use word processing, spreadsheet, database, browser, and basic graphics and presentation applications. For these users Mitsubishi designed its Diamond Plus line of 17 - 21″ (16.0 - 19.7″ diagonal viewable area) displays. Unlike the Diamond Scan line, Diamond Plus displays rely on Mitsubishi's DIAMONDTRON ™ aperture grille technology to provide high color saturation and crisp imagery for the more visually rich applications that corporate users have in their arsenal. Because DIAMONDTRON monitors transmit electron energy more efficiently than those using the conventional shadow mask system, Diamond Plus displays deliver brighter pictures. So users can turn the brightness down and increase the life of the CRT. Plus, since it has a patented scandium-oxide coating on its cathode, a Mitsubishi DIAMONDTRON CRT loses less brightness over its life than other CRTs. These benefits make the Diamond Plus line especially attractive to cost-conscious corporate buyers.

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Monitors in the Diamond Pro line, such as the Diamond Pro 1000, are built to the highest standards for no-compromise Professionals.

Professional.

If your livelihood depends on your computer and you spend most of your day face to face with a monitor, you're a Professional user. No-compromise Professionals want the best technology there is. Since these graphic designers, Web content specialists, multimedia authors, game developers, and CAD engineers depend so much on visualizing their work, they want high-end displays that deliver the best image definition possible. Professionals look for monitors that provide brightness, high-contrast screen coatings, and superior convergence to assure sharp images up to the edge of the screen. For example, Mitsubishi's top-of-the-line Diamond Pro 1010e features Dynamic Digital Convergence — a system that divides the screen into 25 sections and converges each individually, as opposed to converging the entire screen as a single unit. As a result, image clarity does not fall off at the edges or in the corners where users interact with their applications. Like their counterparts in the Diamond Plus line, Diamond Pro displays feature DIAMONDTRON technology. Which means that super-bright Diamond Pro monitors are able to use darker glass to provide better contrast and less reflectivity of ambient room light that washes out colors.

Since they spend so much time looking at a screen, Professionals favor monitors that minimize flicker which can cause eye strain, headaches, and fatigue. That's why Professional users shop for high-resolution displays that deliver sufficient bandwidth to support higher refresh rates that reduce screen flicker.

User Category	Monitor	
Entry Level	Diamond Scan 15VX Diamond Scan 70 Diamond Scan 90e	Diamond Scan 50M Diamond Scan 70M
Performance	Diamond Plus 70	Diamond Plus 100e
Professional	Diamond Pro 87TXM Diamond Pro 700 Diamond Pro 1010e	Diamond Pro 91TXM Diamond Pro 1000

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- 0.28 mm dot pitch

Diamond Scan 70M
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Circle 144 on card or go to www.pcworld.com/infonet

PC WORLD

TOP 20 BUDGET DESKTOPS

	SYSTEM	Last month	Month tested	Street price (7/15/98)	CPU	Comments
1	Gateway GP6-300b 800/846-2000 www.gateway.com	3	Sept 98	$1797	Pentium II-300	$206 off very fast PII-300 with network card and Gateway's typically strong support.
2	Quantex QP6/333 SM-3x 800/896-4898 www.quantex.com	4	Aug 98	$1699	Pentium II-333	$200 price cut keeps PII-333 near top of chart; lots of free bays and slots.
3	Dell Dimension XPS D300 800/388-8542 www.dell.com	7	May 98	$1999	Pentium II-300	$230 price drop earns venerable PII-300 a Best Buy; upgraded hard disk.
4	Quantex QP6/266 M-2x 800/896-4898 www.quantex.com	10	July 98	$1299	Pentium II-266	Another $100 off affordable PII-266 with home and office software, good monitor.
5	Micro Express MicroFlex-K6/300A 800/989-9900 www.microexpress.net	n/a	NEW	$1199	AMD K6-2-300	Great price, fast AMD K6-2 PC with DVD-ROM drive; MPEG-2 video is choppy.
6	CyberMax PowerMax B2 800/437-4596 www.cybermaxpc.com	12	May 98	$1549	Pentium II-300	$250 off system with Zip drive and big 8.4GB hard disk.
7	Micro Express MicroFlex-F300f 800/989-9900 www.microexpress.net	8	May 98	$1399	Pentium II-300	Well-configured and affordable PII-300 with V.90 modem and great warranty.
8	CyberMax ValueMax B8 800/437-4596 www.cybermaxpc.com	9	Sept 98	$1449	Cyrix M II-300	Great graphics and PII-300 performance from Cyrix M II-300 PC.
9	Micro Express MicroFlex-B350b 800/989-9900 www.microexpress.net	5	Sept 98	$1699	Pentium II-350	NT 4.0 on a budget; includes 128MB of RAM and DVD-ROM drive.
10	Unicent Avanta L333 800/308-3614 www.unicent.com	15	June 98	$1699	Pentium II-333	$250 slashed from relatively slow PII-333; phone support could be better.
11	TigerDirect K-Series 300 800/830-0056 www.tigerdirect.com	n/a	Sept 98	$1050	AMD K6-300	$349 price drop puts fast K6-300 PC into the spotlight; lowest price on chart.
12	Quantex QP6/300 SM-4x SE 800/896-4898 www.quantex.com	n/a	May 98	$1999	Pentium II-300	Slow PII-300 sports a 2X DVD-ROM drive and $150 discount, but still pricey.
13	NEC Direction SP E266 888/863-2669 www.necnow.com	n/a	NEW	$1250	Pentium II-266	Super price on well-configured PII-266; NEC's service seems to be improving.
14	Acma NPower 6333P 800/786-6888 www.acma.com	n/a	Aug 98	$1699	Pentium II-333	Expanded 24/7 support and $100 price cut put quick PII-333 on chart.
15	MidWest Micro Office Pro 333 800/728-8582 www.mwmicro.com	n/a	Aug 98	$1929	Pentium II-333	Another $210 off PII-333 with 8.4GB hard drive, but still expensive.
16	ProGen Polaris PII-266 888/776-9595 www.progen.com	n/a	June 98	$1199	Pentium II-266	Another $100 off basic home-office PC with good office software; cluttered interior.
17	Polywell Poly K6266Mx 800/999-1278 www.polywell.com	n/a	May 98	$1250	AMD K6-266	Expandable AMD K6 costs $45 less this month; history of unresponsive support.
18	TigerDirect Tiger Pro 400 800/830-0056 www.tigerdirect.com	14	Sept 98	$1800	Pentium II-400	$199 price cut for PII-400; fastest Win 95 system on budget chart.
19	Xi Computer Xi K200 MTower 800/432-0486 www.xicomputer.com	n/a	May 98	$1249	AMD K6-200	$80 price cut on AMD midtower with 17-inch monitor, skimpy modem.
20	IDot.com 333LX 888/388-4368 www.idot.com	n/a	NEW	$1598	Pentium II-333	New vendor offers lots of hardware, but monitor and manuals could be improved.

Best Buy See features chart, page 226; test report, page 228.

n/a = not applicable

[1] A system's performance word score is relative to scores of other PCs running the same operating system. For more details see "Your Guide to the Top 100" on page 211 of the introduction to the *Top 100*.

CALL IT THE ATTACK OF THE UNDERDOGS. Fewer PII-350s and PII-400s appear on the Budget Desktops chart this month than last, while the Micro Express MicroFlex-K6/300A—based on AMD's new K6-2-300 CPU—secures a Best Buy. A dirt-cheap $1199 price and PII-300–like performance helped seal the deal. Also impressive in its debut is the IDot.com 333LX, a PII-333 midtower from a start-up PC maker that sells exclusively online. A second PC based on the AMD K6-2 processor, NexTrend's $1749 NexStar K62300D, was too pricey to make the cut. Another near miss, Sys Technology's Windows NT–based Sys Performance Pro 300P, was held back in part by its small hard disk and thin documentation.

SCORECARD

★ Overall rating	PC WorldBench 98/operating system	Features and design	Price	Performance [1]	Vendor's system reliability	Vendor's support quality/policies	InfoNet number [2]
81	174/Win 95	very good	expensive	good	average	above average/best	660
81	164/Win 95	very good	average	good	average	average/best	661
81	157/Win 95	very good	expensive	good	above average	above average/best	662
81	138/Win 95	very good	inexpensive	good	average	average/best	663
81	162/Win 95	very good	inexpensive	good	[3]	[3]/best	664
80	152/Win 95	outstanding	average	good	[3]	[3]/best	665
79	161/Win 95	very good	average	good	[3]	[3]/best	666
79	161/Win 95	very good	average	good	[3]	[3]/best	667
78	228/Win NT 4.0	good	average	outstanding	[3]	[3]/best	668
78	158/Win 95	very good	average	good	[3]	[3]/best	669
78	153/Win 95	good	inexpensive	good	[3]	[3]/good	670
77	136/Win 95	outstanding	expensive	satisfactory	average	average/best	671
77	151/Win 95	good	inexpensive	good	below average	average/good	672
77	177/Win 95	good	average	very good	[3]	[3]/best	673
77	167/Win 95	very good	expensive	good	[3]	[3]/good	674
76	147/Win 95	very good	inexpensive	good	[3]	[3]/fair	675
76	145/Win 95	very good	inexpensive	good	[3]	[3]/fair	676
76	194/Win 95	good	expensive	very good	[3]	[3]/good	677
75	117/Win 95	good	inexpensive	satisfactory	[3]	[3]/best	678
74	178/Win 95	good	average	very good	[3]	[3]/good	679
Scorecard weightings ▶		Features 25 percent	Price 22 percent	Performance 18 percent	Reliability 15 percent	Quality/policies 10 percent each	

[2] For more information about all products in this table, select InfoNet no. 904 or visit www.pcworld.com/infonet.
[3] Insufficient data to give a rating.

This Month's Best Buys

1 GATEWAY GP6-300B

PRO: Blazing Windows 95 performance for a PII-300, top-notch support policies

CON: Slightly wobbly case with rounded top

The $1797 Gateway GP6-300b replaces the discontinued G6-333 as the number one budget Best Buy this month, jumping from third place thanks to a $206 price cut. Like the older G6-300b, this midtower gets the most out of its CPU, with a PC WorldBench 98 score of 174 that is unrivaled in its Windows 95–based processor class. It comes complete with Microsoft Office 97 Small Business Edition, Microsoft Bookshelf, and a solid multimedia configuration.

This fleet-footed Pentium II-300 is an excellent option if you need a fully configured system for a small network: The 3Com Fast EtherLink XL network card provides quick, 100-megabits-per-second networking. You'll also find an 8.1GB hard disk—spacious by budget-list standards—and a quick 13X–32X CD-ROM drive. We found the 8MB AccelStar II 3D graphics accelerator well matched with the bright 17-inch monitor. Finally, we're big fans of Gateway's large keyboards, which allow for comfortable typing and come with extra control buttons to put your PC into sleep mode, launch your Internet browser, and perform other common tasks.

Gateway GP6-300b

We found the case on the GP6-300b a bit wobbly, and Gateway's trademark chassis means you can't stash your disks or external drives on the rounded top. Inside, you'll find three expansion slots (two PCI, one ISA), as well as three externally accessible drive bays and two internal bays.

Gateway delivers plenty of product support, with three years of coverage on parts and labor, as well as technical phone support around the clock. Our recent calls to Gateway's tech support lines revealed friendly and knowledgeable service, though we were disconnected and then waited 11 minutes on our next call before we finally got to speak to a representative.

2 QUANTEX QP6/333 SM-3X

PRO: Affordable, lots of room to upgrade

CON: Hard-to-open case, messy internal cables

The Quantex QP6/333 SM-3x shuffles up two spots on the Budget Desktops chart—from fourth place to second—thanks to a $200 price cut to $1699. This affordable Pentium II-333 midtower won't break any performance records, however: Its PC WorldBench 98 score of 164 is the second slowest among PII-333 systems appearing on the budget chart this month.

So what makes the QP6/333 SM-3x such an attractive buy? All Quantex systems benefit from the company's superior support policies; the vendor shone in our ▶

PHOTOGRAPHS: ALEN SMITH

TOP 20 BUDGET DESKTOPS — STANDARD FEATURES

	SYSTEM	CPU	Operating system	RAM (MB)	Secondary cache (KB)	Hard drive (GB)	Graphics adapter (AGP unless otherwise noted)	Video RAM (MB/type)	Monitor tube/ viewable diagonal (inches)	Modem speed (kbps)
1	Gateway GP6-300b*	Pentium II-300	Windows 95	64	512	8.1	AccelStar II 3D	8/SGRAM	17/16	not included
2	Quantex QP6/333 SM-3x*	Pentium II-333	Windows 95	64	512	6.4	ST8 Velocity 128	4/SGRAM	17/16.1	56 [3]
3	Dell Dimension XPS D300*	Pentium II-300	Windows 95	64	512	10	ST8 Velocity 128	4/SGRAM	17/15.8	56 [2]
4	Quantex QP6/266 M-2x*	Pentium II-266	Windows 95	32	512	4.1	ST8 Velocity 128	4/SGRAM	17/16.1	56 [3]
5	Micro Express MicroFlex-K6/300A*	AMD K6-2-300	Windows 95	64	1024	6.4	ATI Xpert@Work	4/SGRAM	17/16.1	56 [3]
6	CyberMax PowerMax B2	Pentium II-300	Windows 95	64	512	8.4	ST8 Velocity 128	4/SGRAM	17/16.1	56 [3]
7	Micro Express MicroFlex-F300f	Pentium II-300	Windows 95	64	512	6	ATI Xpert@Work	8/SGRAM	17/15.8	56 [4]
8	CyberMax ValueMax B8	Cyrix M II-300	Windows 95	64	512	8	3Labs Permedia 2	8/SGRAM	17/15.7	56 [3]
9	Micro Express MicroFlex-B350b	Pentium II-350	Windows NT 4.0	128	512	6.2	ATI Xpert@Work	4/SGRAM	17/15.9	56 [4]
10	Unicent Avanta L333	Pentium II-333	Windows 95	64	512	8.4	ATI Xpert@Work	4/SGRAM	17/15.9	56 [2]
11	TigerDirect K-Series 300	AMD K6-300	Windows 95	64	1024	6.2	Matrox Productiva	8/SDRAM	17/15.8	56 [3]
12	Quantex QP6/300 SM-4x SE	Pentium II-300	Windows 95	32	512	6.4	Diamond Viper V330	4/SGRAM	19/17.9	56 [3]
13	NEC Direction SP E266	Pentium II-266	Windows 95	64	512	6.2	integrated ATI 3D Rage Pro	4/SGRAM	15/13.9	56 [2]
14	Acma NPower 6333P	Pentium II-333	Windows 95	64	512	6.4	Diamond Viper V330	4/SGRAM	17/15.8	not included
15	MidWest Micro Office Pro 333	Pentium II-333	Windows 95	64	512	8.4	ATI Xpert@Play	8/SGRAM	17/16.1	not included
16	ProGen Polaris PII-266	Pentium II-266	Windows 95	32	512	8.4	Number Nine Revolution 3D	8/WRAM	17/16	56 [2]
17	Polywell Poly K6266Mx	AMD K6-266	Windows 95	64	512	7	Diamond Stealth 3D 2000 Pro (PCI)	4/EDO DRAM	17/15.8	56 [3]
18	TigerDirect Tiger Pro 400	Pentium II-400	Windows 95	64	512	6.6	Number Nine Revolution 3D	8/SGRAM	17/15.8	56 [3]
19	Xi Computer Xi K200 MTower	AMD K6-200	Windows 95	32	512	4.3	Number Nine Revolution 3D (PCI)	8/WRAM	17/15.9	33.6
20	IDot.com 333LX	Pentium II-333	Windows 95	64	512	8.4	Intel Express 3D	8/SDRAM	17/16.1	56 [2]

* Best Buy

[1] *PC World* defines towers as taller than 20 inches, midtowers as 15.5 inches to 20 inches, and minitowers as shorter than 15.5 inches.
[2] Downloads only, uploads at 33.6 kbps; uses 3Com/U.S. Robotics' x2 technology.
[3] Downloads only, uploads at 33.6 kbps; uses Rockwell-Lucent's K56flex technology.

Quantex QP6/333 SM-3x

recent calls to its tech support lines. The SM-3x offers plenty of room for expansion too—a critical advantage if you want to add an Iomega Zip drive or an internal hard disk sometime down the road. Because the only free bays are 5.25 inches wide, you'll probably need special rails to mount smaller internal or external drives. Otherwise, the SM-3x boasts a competitive configuration, including a 6.4GB hard disk and a sharp 17-inch Quantex monitor.

Quantex guarantees the QP6/333 SM-3x's hardware for three years and will fix the system for free during the first year. If you need it, technical support is available from Quantex's 24-hour phone line, as well as from its BBS and Web site (both of which provide updated drivers).

3 DELL DIMENSION XPS D300

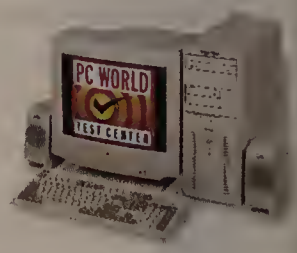
PRO: Largest hard disk on budget chart, hardware includes DVD-ROM and Iomega Zip drives

CON: Limited expandability, tricky case removal

With a sticker price of $1999, the Dell Dimension XPS D300 barely squeezed under our newly lowered budget price cutoff. However, this muscle-bound PII-300 midtower—which reigned over the Power Desktops chart in April—stands apart with a DVD-ROM drive, an internal Iomega Zip drive, and a whopping 10GB hard disk—the largest hard disk of any system on the Budget Desktops chart this month.

The sharp 17-inch screen provides a sufficient viewing area, although it lacks some of the more sophisticated controls found on higher-quality displays. Multimedia applications receive an additional boost from the nifty Altec Lansing ACS-290 speaker-subwoofer set. The XPS D300 comes with Microsoft Office 97 Small Business Edition, a welcome addition for those in any office environment.

Dell provides nice touches like color-coding and symbols on the back ports, but you'll want to read the included system documentation before attempting to remove the case—it's not as intuitive a procedure as it may



Dell Dimension XPS D300

		EXPANDABILITY					CUSTOMER SUPPORT			
CD/DVD-ROM drive speed	Sound board	Case style[1]	Max. RAM (MB)	Open RAM sockets	Open drive bays (ext./int.)	Open slots	Warranty for parts/labor (years)	Weekday toll-free support (hours)	Weekend support	Online support
13X-32X	Ensoniq AudioPCI	midtower	384	2	3/2	3	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
12X-32X	Ensoniq AudioPCI	midtower	384	2	3/3	4	3/1	24	Sat., Sun.	BBS, WWW
2X DVD-ROM	Turtle Beach Montego	midtower	384	2	2/1	2	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
13X-32X	Ensoniq AudioPCI	midtower	384	2	3/3	4	3/1	24	Sat., Sun.	BBS, WWW
2X DVD-ROM	Sound Blaster AWE64	midtower	384	4	3/0	0	4/4	24	Sat., Sun.	WWW
13X-32X	Ensoniq AudioPCI 9752	midtower	512	2	3/3	4	3/1	24	Sat., Sun.	BBS, WWW
14X-32X	Super Sound32 32W-3D	midtower	512	2	3/0	4	4/4	24	Sat., Sun.	WWW
14X-32X	Ensoniq AudioPCI	midtower	256	5	3/3	3	3/1	24	Sat., Sun.	BBS, WWW
2X DVD-ROM	Sound Blaster AWE64	midtower	768	1	3/0	4	4/4	24	Sat., Sun.	WWW
13X-32X	Ensoniq AudioPCI	midtower	384	2	3/1	4	3/3	24	Sat., Sun.	BBS, WWW
12X-32X	Yamaha OPL3-Sax	midtower	384	2	3/0	4	3/3	15	Sat.	WWW
2X DVD-ROM	Ensoniq AudioPCI	midtower	512	3	3/3	4	3/1	24	Sat., Sun.	BBS, WWW
8X-20X	integrated Yamaha DS-XG	midtower	384	1	3/1	2	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
32X	Yamaha OPL3-Sax	compact	384	2	0/0	3	3/1	24	Sat., Sun.	BBS, WWW
12X-32X	Ensoniq AudioPCI	midtower	384	1	2/1	4	varies[5]/3	24	Sat., Sun.	BBS, WWW
14X-32X	S3 Sonic Vibes	minitower	1024	2	3/1	4	3/1	9.5	none	BBS, WWW
12X-24X	CS37-3DIS	midtower	256	4	3/0	4	3/5	24	Sat., Sun.	WWW
12X-32X	OEM	midtower	384	2	3/0	4	3/3	15	Sat.	WWW
13X-24X	OEM Yamaha 71B/719	midtower	256	5	3/0	4	3/3	24	Sat., Sun.	WWW
12X-36X	Aztech PCI 33B-A3D	midtower	384	1	3/0	4	varies[5]/1	12[6]	none	WWW

[4] Downloads only, uploads at 33.6 kbps; uses V.90 industry standard technology.
[5] Five years on CPU and system memory, three years on all other parts.
[6] Vendor plans 24/7 support as of 8/15/98.

seem at first. Inside, the modem and the sound card take up both ISA slots, which leaves only two free PCI slots available. The two free DIMM sockets accommodate RAM upgrades, since DIMMs (unlike SIMMs) may be added one at a time. Dell supplies the Dimension XPS D300 with three free drive bays.

Dell's documentation is better than most. We liked the foldout setup guide, but we would have preferred greater technical depth nonetheless. Support policies include a three-year parts and one-year labor warranty, with 24-hour toll-free phone support. Tack on Dell's commendable record of customer service, and the D300 is a good buy for someone who needs a loaded PC and doesn't mind paying a bit more for it.

4 QUANTEX QP6/266 M-2X

PRO: Great software bundle, quality monitor

CON: Relatively slow performance, poor speakers

With the Quantex QP6/266 M-2x, compromise is the name of the game. This Pentium II-266 is not the fastest PC you can buy. In fact, its PC WorldBench 98 score of 138 makes it the slowest PII-266 we've tested. But at $1299 (after a $100 price cut) it's plenty affordable. Add a pile of useful software and Quantex's extensive support policies, and the M-2x is a fine budget-minded system for the home or office.

Quantex cut a few corners to achieve the low price. The system comes with 32MB of RAM—half the amount used in most PCs on the budget chart—and the 4.1GB hard disk is one of the smallest installed among the systems on the chart. To make the purchase more worthwhile, Quantex throws in business applications such as Microsoft Office 97 SBE, the Learning Company's Project Manager Pro, Compton's Reference Collection, and SoftKey's OfficeMate, Form Designer Pro, and Day Planner software.

Quantex QP6/266 M-2x

The 17-inch MAG 720V2 monitor impressed us with pleasing images—a critical advantage for users who work long hours—and includes the innovative Jag control dial for adjusting display settings. The STB Velocity 128 AGP graphics card comes with 4MB of SGRAM and provides first-rate 2D and 3D acceleration, ▶

though video playback is poor. Unfortunately, the Altec Lansing ACS90 speakers sound tinny and lack the range needed to produce extreme highs and lows.

The case is conveniently designed to accommodate upgrades: The top slides off after you remove three thumbscrews. For the most part, manuals provide comprehensive information. One booklet shows you how to access the Internet with the generic 56-kbps (K56flex) modem—but not how to make the modem work with the included desktop microphone or Ring Central telephony software.

5 MICRO EXPRESS MICROFLEX-K6/300A

PRO: Inexpensive; generous technical support policies; large secondary cache; DVD-ROM drive

CON: Difficult-to-remove cover; generic keyboard, mouse, and speakers; choppy video playback

Don't think AMD's new K6-2 processor is for real? Check out the MicroFlex-K6/300A, which premieres at fifth place on the budget chart. Based on the K6-2-300 processor, this $1199 system combines PII-300–like performance with low cost and great features.

Micro Express MicroFlex-K6/300A

With its generous 1024KB secondary cache (twice that of most CPUs), the K6-2-300 processor drove this system to a PC WorldBench score of 162. Not only is ▶

TOP 20 BUDGET DESKTOPS

TEST REPORT

	SYSTEM	CPU	Operating system	RAM (MB)	Secondary cache (KB)	PC World-Bench 98 score
1	Gateway GP6-300b*	Pentium II-300	Win 95	64	512	174
2	Quantex QP6/333 SM-3x*	Pentium II-333	Win 95	64	512	164
3	Dell Dimension XPS D300*	Pentium II-300	Win 95	64	512	157
4	Quantex QP6/266 M-2x*	Pentium II-266	Win 95	32	512	138
5	Micro Express MicroFlex-K6/300A*	AMD K6-2-300	Win 95	64	1024	162
6	CyberMax PowerMax B2	Pentium II-300	Win 95	64	512	152
7	Micro Express MicroFlex-F300f	Pentium II-300	Win 95	64	512	161
8	CyberMax ValueMax B8	Cyrix M II-300	Win 95	64	512	161
9	Micro Express MicroFlex-B350b	Pentium II-350	Win NT 4.0	128	512	228
10	Unicent Avanta L333	Pentium II-333	Win 95	64	512	158
11	TigerDirect K-Series 300	AMD K6-300	Win 95	64	1024	153
12	Quantex QP6/300 SM-4x SE	Pentium II-300	Win 95	32	512	136
13	NEC Direction SP E266	Pentium II-266	Win 95	64	512	151
14	Acma NPower 6333P	Pentium II-333	Win 95	64	512	177
15	MidWest Micro Office Pro 333	Pentium II-333	Win 95	64	512	167
16	ProGen Polaris PII-266	Pentium II-266	Win 95	32	512	147
17	Polywell Poly K6266Mx	AMD K6-266	Win 95	64	512	145
18	TigerDirect Tiger Pro 400	Pentium II-400	Win 95	64	512	194
19	Xi Computer Xi K200 MTower	AMD K6-200	Win 95	32	512	117
20	IDot.com 333LX	Pentium II-333	Win 95	64	512	178

*Best Buy

Word 97 · Word Pro 97 · Excel 97 · 1-2-3 97 · Paradox 8.0 · Picture Publisher 7.0

TEST PC WORLD CENTER **HOW WE TEST** All systems are tested with PC World8ench 98, *PC World's* application-based benchmark. A higher PC World8ench score is better. All PCs are tested with either Windows 95 or Windows NT 4.0, and video resolution is set to 800 by 600 in 65,536 colors. We run automated scripts on six popular business applications, performing common tasks such as spelling checks, scrolls, saves, sorts, and recalculations. The PC World8ench 98 score is a sum of the weighted, normalized result of each script: Word 97 (10 percent), Word Pro 97 (10 percent), Excel 97 (20 percent), 1-2-3 97 (20 percent), Paradox 8.0 (20 percent), and Picture Publisher 7.0 (20 percent). For more details on our benchmark and how we run it, see PC World Online (www.pcworld.com/testing). [1]Under Windows 95.

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the K6/300A the fastest system you can buy for under $1300, it's probably the most feature-rich. At least on our chart, no other system outfitted with a DVD-ROM drive and a 17-inch monitor comes close to MicroFlex's price. A 6.4GB hard disk offers plentiful storage, and the Sound Blaster AWE64 sound card powers a pair of speakers that produced fine sound quality, with plenty of volume and no noticeable distortion.

Did Micro Express cut corners to arrive at this fantastic price point? You bet. The system is missing a hardware decoder for MPEG-2 video, yielding choppy video playback. And the 17-inch Impression 7 Plus monitor lacks the crisp graphics and text we'd want in a multimedia PC. The display also had a distinctly bluish cast, even after we made adjustments with the easy-to-use software/hardware controls.

NEC Direction SP E266

Moreover, the K6/300A looks strikingly bland. The keyboard and two-button mouse (without thumbwheel) are basic, and the midtower chassis is so vanilla that it should ship with an ice-cream cone. Getting inside the PC is an adventure. You must remove four Phillips-head screws, then pull and tug to get the cover off. Putting the cover back on is another challenge. But inside, an uncluttered and well-designed interior offers easy access to memory, sockets, and card slots. Sealing the deal is Micro Express's exceptional four-year parts and labor warranty, as well as around-the-clock telephone support.

New This Month

The following PCs made our Budget Desktops chart for the first time this month. For original reviews of previously tested PCs on the chart, visit our Web page (www.pcworld.com/top400).

13 NEC DIRECTION SP E266

PRO: Inexpensive, nice budget configuration

CON: Limited upgradability, slower than most budget PC on chart, smallish (15-inch) monitor

Sub-$1000 PCs have had a hard time cracking the Budget Desktops chart because of major compromises in either features or performance. Enter the NEC Direction SP E266. Its Pentium II-266 processor, 64MB of RAM, and 6.2GB hard disk make this well-equipped midtower a bargain at $1250.

That price commands a diminutive 15-inch monitor, but the NEC C550 screen doesn't disappoint, delivering a crisp and bright picture. It's driven by an integrated ATI 3D Rage Pro graphics chip that provides adequate entry-level 3D graphics and video support. The NEC also comes with a 3Com/U.S. Robotics' 56-kbps Winmodem to help you get online quickly.

So what keeps the SP E266 from vaulting even higher on our charts? Performance, for one thing. The SP E266's PC WorldBench score of 151 is typical of PII-266 systems, but it's slow compared with most of the machines on our Top 20 budget chart. Expandability is also limited, with only two free PCI card slots and a single DIMM socket for additional system RAM.

On the upside, we reached technical support representatives quickly and received accurate answers to our queries. The NEC Direction SP E266 may be just the general-purpose machine for budget-minded PC users.

20 IDOT.COM 333LX

PRO: Inexpensive, good performance, top-notch graphics adapter, generous warranty

CON: No track record on service or reliability, doesn't come with software bundle

A new player on the PC scene, IDot.com sells its PCs only over the Web—no catalogs, no phone sales reps, no retail stores. Buying a PC from a new company over the Internet may sound scary, but the $1598 333LX could draw you in. This Pentium II-333 machine costs $400 less than an average, similarly configured PC, yet it is quick for its class, with a PC WorldBench 98 score of 178.

To see if IDot.com was legitimate, we made anonymous calls to its tech support line and got quick and courteous answers to our queries. It's worth noting, however, that the same tech support representative answered all three of our calls, which makes us suspect that the service operation is very small. IDot.com plans to upgrade its tech support to 24/7, but we were unable to verify this at press time.

The company's parts warranty is impressively lengthy—five years on both CPU and RAM, three years on other parts—but labor is free for only one year.

We also noted some shortcomings. Documentation consists of component manuals only, and the interior design suffers from a few hiccups. We found four open ISA slots but no free PCI slots. Inexplicably, the ISA sound card was installed in the shared ISA/PCI space, robbing the system of its final PCI slot.

We can't complain about the rest of the components in this system. The generic-looking beige midtower includes an 8.4GB hard disk, an 8MB Intel Express 3D graphics card, and a 17-inch Digital Research Technologies monitor. We would have preferred a crisper display, but the screen controls were easy to use. The ACS43 Altec Lansing speakers pass muster, provided you don't push the volume too high, since bass response gets a little muddy as you crank it up. Be aware that you'll have to shell out for software, since the 333LX doesn't come bundled with any.

IDot.com 333LX

Overall, the IDot.com 333LX looks like a good value. The system delivers a lot of hardware at a low price, and throws in impressive performance to boot. But you'll have to decide for yourself if you want to be among the first customers to invest in a new company. ▶

BEYOND THE TOP 20

online

We evaluated the following systems along with the others, but they didn't score high enough to reach the Top 20 Budget Desktops chart. For write-ups, visit PC World Online (www.pcworld.com/t20pcs).

- NexTrend NexStar K62300D
- Sys Technology Sys Performance Pro 300P
- Tagram Thunderbolt H2200
- Tagram Thunderbolt H2700
- Total Peripherals Serengeti 3

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PC Magazine

"SuperScan Elite 751 led the pack... delivers the same high-end image quality expected of the manufacturer... 1997 Product of the Year"

Imaging

"The best image available... SuperScan Elite 751"

Computer Shopper

"SuperScan Pro 800 is a true bargain... solid scores... terrific price"

PC Computing

"Our top 21-inch monitor... SuperScan Elite 802 had the best image quality... and its price is low"

Byte

"The Elite 802's image is solid in all respects, all the way up to 1800 x 1440 ... excellent performance at a reasonable price"

Cadalyst

"Best buy... SuperScan Pro 500 displays razor sharp text and graphics... very crisp text detail, accurate color graphics quality... terrific low price"

PC World

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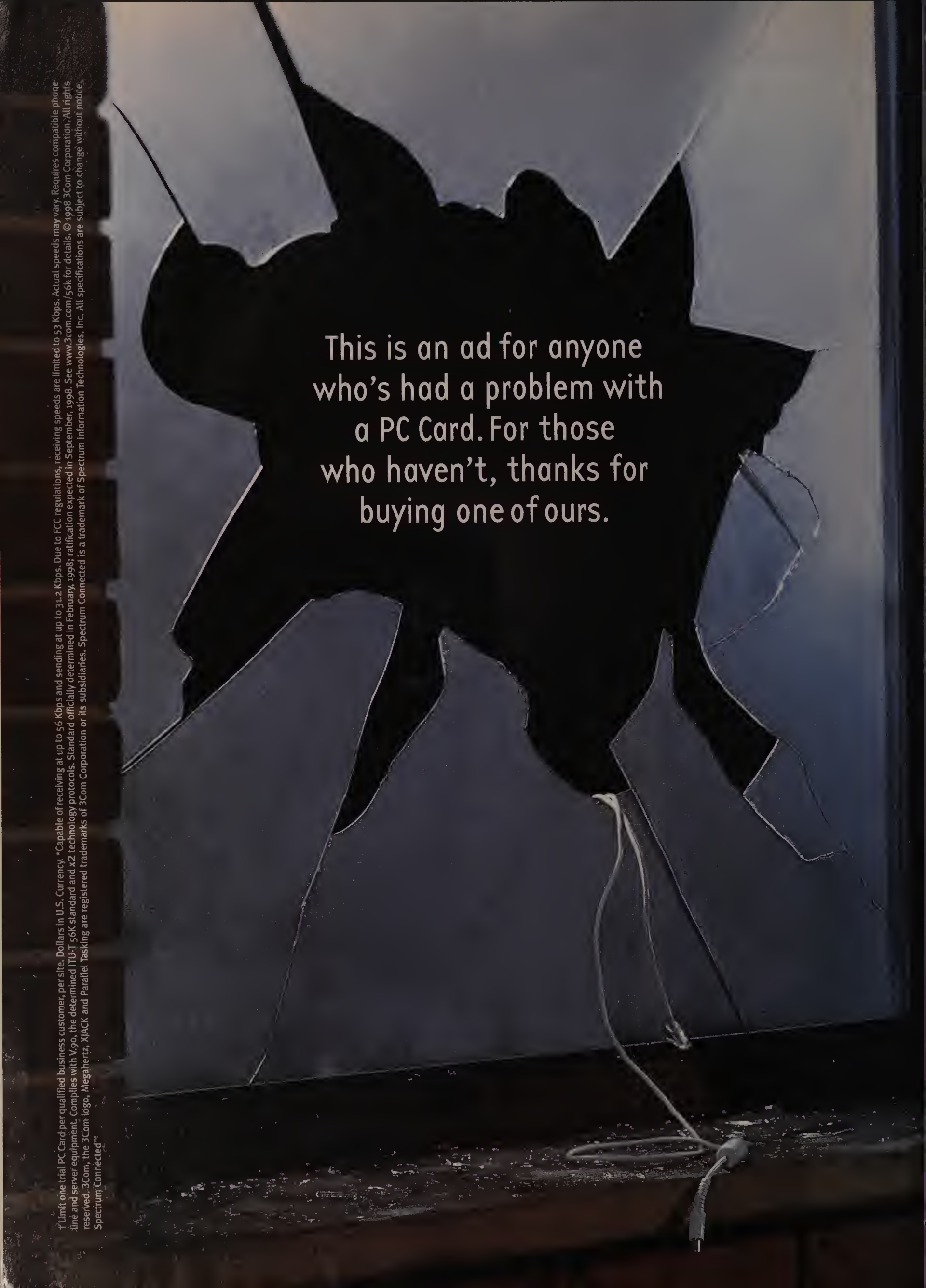

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TOP 10 NOTEBOOK PCs

	POWER NOTEBOOK	Last month	Month tested	Street price (7/17/98)	CPU	Comments
1	Dell Latitude CPi D266XT 800/388-8542 www.dell.com	1	July 98	$3398	Pentium II-266	Thin, fast, well-designed notebook in first place for second month in a row.
2	Compaq Armada 4220T 800/345-1518 www.compaq.com	n/a	May 98	$2799	Pentium MMX-266	$500 price cut lifts superb traveler with top-notch battery life to number two.
3	Micron GoBook 266 888/634-8799 www.micronpc.com	n/a	Aug 98	$3198	Pentium MMX-266	$250 drop in price brings notebook with monster battery life back to chart.
4	WinBook XLi 266 800/965-9349 www.winbook.com	4	Aug 98	$3408	Pentium II-266	Fast desktop alternative has high-end multimedia features, skimpy support.
5	Gateway Solo 9100LS 800/846-2000 www.gateway.com	5	Sept 98	$3464	Pentium II-266	High-end notebook with 14.1-inch screen drops $200; optional DVD-ROM drive.
	BUDGET NOTEBOOK					
1	Acer Extensa 367D 800/733-2237 www.acer.com/aac	1	Sept 98	$1299	Pentium MMX-200	A real bargain; $200 price cut keeps inexpensive, light notebook on top.
2	Fujitsu PC LifeBook 280Dx 888/466-8434 www.fujitsu-pc.com	n/a	NEW	$1499	Pentium MMX-233	Impressive features, including a Zip drive, for a great price.
3	Gateway Solo 2500SE 800/846-2000 www.gateway.com	n/a	Sept 98	$2149	Pentium II-233	$300 price drop on fast, light notebook with built-in CD-ROM and floppy drives.
4	Dell Inspiron 3200 D266XT 800/388-8542 www.dell.com	n/a[4]	June 98	$2749	Pentium II-266	$150 reduction moves powerful notebook with poor battery to budget chart.
5	Enpower ENP-801 800/997-2258 www.enpower.com	n/a	NEW	$1999	AMD K6-266	Fast and heavy desktop replacement notebook has strong battery.

Best Buy See features chart, page 236.

n/a = not applicable [1] Includes computer, adapter, power cord, and floppy drive or CD-ROM drive. [2] For more information about all products in this table, select InfoNet no. 902 or

ALTHOUGH HOT-ROD PENTIUM II notebooks get all the attention these days, older Pentium MMX laptops are holding their own, thanks to falling prices, solid performance ratings, and outstanding battery life. These factors helped the Compaq Armada 4220T and Micron GoBook 266—both powered by PMMX-266 processors—land on this month's power chart.

Among the nine new notebooks tested this month, the $1499 Fujitsu PC LifeBook 280Dx, a good starter laptop, jumps onto the budget chart. So does the Enpower ENP-801. It's the first notebook we've tested from Enpower, which has been assembling and selling computers for five years. The ENP-801 boasts a fast yet affordable AMD K6-266 processor.

EXTERNAL DVD ARRIVES

THINKING ABOUT ADDING DVD to your old notebook? Now you can, but for a price that might make you wince. EXP Computer's $699 DVD Traveler Plus, the first external DVD-ROM kit for notebooks we've seen, consists of a small second-generation Toshiba DVD-ROM drive and two PC Cards. One card connects the notebook to the drive; the other, made by Margi Systems, handles MPEG-2 decoding. Your notebook must have at least a P-133 CPU and a Zoom Video PC Card slot. In our tests, the type of video controller in the notebook also affected DVD playback.

We tested a prerelease version of the kit on a Compaq Armada 1700, a MAG Verity 233VLT, and a Hewlett-Packard OmniBook 2100. After a glitch-free installation, we tested the DVD drive using Microsoft's Encarta encyclopedia; Multicom's Great Chefs, Great Cities; and the film *Con Air*. The sound on all of them was great, especially when we attached external speakers. But picture quality was another story.

The images on the Armada 1700 and Verity 233VLT, which use a Chips & Technology 65555 graphics adapter, had jagged edges and lacked fine detail. The video on the OmniBook, which uses a NeoMagic MagicGraph128XD graphics chip set, was sharp and detailed.

• **DVD Traveler Plus; $699 list; EXP Computer; 800/397-6922; www.expnet.com.**

INFONET NO. 640

This Month's Best Buys

POWER NOTEBOOKS

1 DELL LATITUDE CPI D266XT

PRO: Great design, stable configuration

CON: Merely adequate battery life

The Dell Latitude CPi D266XT, one of the best-designed notebooks we've seen, remains the laptop of choice on the power chart for the second consecutive month, thanks to its hot performance and top-notch features.

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SCORECARD

★ Overall rating	PC WorldBench 98 score/performance	Price	Vendor's system reliability	Features and design	Vendor's support quality/policies	Battery life (hours:min)/ rating	Traveling weight [1]	InfoNet number [2]
85	146/outstanding	average	average	outstanding	average/good	3:44/adequate	average	630
83	120/good	inexpensive	average	satisfactory	above average/good	7:27/outstanding	light	631
83	116/satisfactory	average	above average	good	[3]/fair	8:09/outstanding	average	632
82	148/outstanding	average	average	outstanding	average/poor	2:56/poor	heavy	633
82	149/outstanding	average	average	very good	below average/fair	5:02/good	heavy	634
Power scorecard weightings ▶	**Performance 22 percent**	**Price 14 percent**	**Reliability 22 percent**	**Features 16 percent**	**Support 10 percent**	**Battery life 8 percent**	**Weight 8 percent**	
88	102/good	very inexpensive	[3]	good	[3]/poor	6:15/very good	light	635
85	109/very good	very inexpensive	[3]	good	[3]/fair	4:23/satisfactory	average	636
84	131/outstanding	average	average	good	below average/fair	4:34/satisfactory	light	637
83	145/outstanding	very expensive	average	outstanding	average/fair	2:58/poor	average	638
83	120/outstanding	average	[3]	very good	[3]/poor	5:59/good	heavy	639
Budget scorecard weightings ▶	**Performance 14 percent**	**Price 22 percent**	**Reliability 22 percent**	**Features 16 percent**	**Support 10 percent**	**Battery life 8 percent**	**Weight 8 percent**	

visit www.pcworld.com/infonet. [3] Insufficient data to give a rating. [4] Was second-ranked notebook on power chart in September.

You'll like the notebook's sleek, charcoal-gray look. The front has swept curves instead of the flat bulldog face found on most portables. At 1.7 inches, the CPi D266XT is also a bit thinner than the standard 2-inch-thick portable.

Dell's Latitude CPi D266XT has a slim 1.7-inch profile.

Lifting the screen uncovers a spacious keyboard whose tall keys are easy to use. The notebook's typing action feels pleasantly crisp despite some detectable side-to-side wiggling. We were also impressed by the responsive and accurate touchpad.

Fire up the notebook and you see a sharp 13.3-inch active-matrix screen. The placement of speakers on each side of the notebook produces better-than-usual audio with a remarkable amount of sound separation. Other nice touches include a Yamaha wavetable synthesizer that enhances the sound of MIDI files, and a 4GB hard drive that is set in shock-absorbing mounts.

Equipped with a Pentium II-266 processor and 64MB of SDRAM, the Dell Latitude CPi D266XT is extremely fast. But like all the other PII notebooks we've tested, it quickly drains a battery—its battery life was just 3 hours and 44 minutes in our tests. That's not the worst rating on the chart, but it falls well short of the Micron GoBook 266's 8-hour battery life score. For $169 you can purchase a second battery for the CPi D266XT, put it in the modular bay (in place of the CD-ROM or floppy drive), and run two power packs simultaneously.

Corporate buyers who have long been frustrated with the short shelf life of most notebooks will appreciate Dell's promise not to significantly change the Latitude CPi D266XT at least through mid-1999. The company's usual classy on-screen and hard-copy documentation is included. For times when you need human contact, the vendor offers around-the-clock technical support; unfortunately, we found the staff's advice to be off the mark occasionally.

The Acer Extensa 367D's mouse buttons are small.

BUDGET NOTEBOOKS

1 ACER EXTENSA 367D

PRO: Lowest price on chart, light

CON: External floppy drive, mushy keyboard

This starter-home of notebook computers makes a fine travel companion—and a $200 price drop to $1299 keeps it atop the budget chart for the second month in a row.

At 7.2 pounds, the Extensa 367D is low-fat for a general-purpose model and the second-lightest notebook on the entire chart. Another plus is the battery's 6-hour-plus stamina—that's a good thing, since this portable can't use two batteries simultaneously. The 367D's integrated ▶

PHOTOGRAPHS: KEN SMITH

TOP 10 NOTEBOOK PCs — STANDARD FEATURES

	POWER NOTEBOOK	CPU	Traveling weight (pounds)[1]	RAM (MB)	Hard drive (GB)	Color screen type	Screen diagonal (inches)	Screen resolution	Maximum screen colors	Battery type	Pointing device
1	Dell Latitude CPi D266XT*	Pentium II-266	7.6	64	4	active	13.3	1024 x 768	65,536	lithium ion	touchpad
2	Compaq Armada 4220T	Pentium MMX-266	7.2	32	4	active	12.1	800 x 600	16.8 million	lithium ion	touchpad
3	Micron GoBook 266	Pentium MMX-266	8.2	32	2	active	12.1	800 x 600	16.8 million	lithium ion	touchpad
4	WinBook XLi 266	Pentium II-266	8.6	64	4	active	13.3	1024 x 768	16.8 million	lithium ion	eraserhead
5	Gateway Solo 9100LS	Pentium II-266	9.6	48	4	active	14.1	1024 x 768	262,144	lithium ion	touchpad
	BUDGET NOTEBOOK										
1	Acer Extensa 367D*	Pentium MMX-200	7.2	32	2.1	dual-scan	12.1	800 x 600	16.8 million	NiMH	touchpad
2	Fujitsu PC LifeBook 280Dx	Pentium MMX-233	8.2	32	3.2	dual-scan	12.1	800 x 600	65,536	lithium ion	Ergotrac
3	Gateway Solo 2500SE	Pentium II-233	7.1	32	2.1	active	12.1	800 x 600	262,144	lithium ion	touchpad
4	Dell Inspiron 3200 D266XT	Pentium II-266	7.4	64	4	active	13.3	1024 x 768	16.8 million	lithium ion	touchpad
5	Enpower ENP-801	AMD K6-266	9.0	32	3.1	active	13.3	1024 x 768	16.8 million	lithium ion	touchpad

*Best Buy ● Yes ○ No [1] Includes computer, adapter, power cord, and floppy drive or CD-ROM drive. [2] Downloads only, uploads at 33.6 kbps; uses 3Com/U.S. Robotics' x2 technology.

modem means you won't forget to take it with you when you hit the road.

The 367D is dressed conservatively in dark gray, with a curved front. Owing to the notebook's unusual bay placement, the battery pack is easy to access from the side of the notebook rather than from the bottom. The CD-ROM drive is located next to the battery.

On the downside, this notebook doesn't accept an internal floppy drive: You have to connect it externally to the parallel port. (That means you can't use a printer and the Extensa 367D's floppy drive at the same time—a minor inconvenience.)

The laptop's 12.1-inch dual-scan screen is more than adequate for word processing, but heavy graphics users will do better with an active-matrix screen. The large keyboard feels a bit mushy. The touchpad responds well, but the mouse buttons are too small—your fingers will have to fumble around to find them. Overall, though, the Extensa 367D is sturdy enough.

Acer provides a standard one-year warranty and around-the-clock technical support. Our anonymous calls to Acer suggest that the company is improving its support quality. In the past, we were put on hold for an unacceptable 22 minutes and given wrong information. In two calls made more recently, we waited less than a minute to talk with reps. However, the advice the staff provided in response to our questions was not always on target.

New This Month

The following PCs made our power and budget notebook charts for the first time this month. To find original reviews of previously tested notebooks on this month's charts, visit www.pcworld.com/top400.

BUDGET NOTEBOOKS

2 FUJITSU PC LIFEBOOK 280DX

PRO: Great price, includes Zip drive

CON: Heavier than some other chartmakers

If you're a student or a small-business owner on a budget, the low-priced Fujitsu PC LifeBook 280Dx will handle your basic tasks without a hitch.

At $1499, it's one of the least expensive Pentium MMX-233 notebook we've ever tested. Although its processor isn't one of the latest Pentium IIs, the 280Dx is plenty fast for most applications.

The LifeBook's design is very versatile. Two multifunction bays dominate the front of the machine. The left-hand bay accepts a battery, floppy, or Zip drive; the right-hand bay takes the CD-ROM drive and will accept a second battery, Zip, or floppy drive when mounted in the included adapter tray. While a growing number of notebooks today accept an optional internal Zip drive, the LifeBook 280Dx is the first we've seen to include this handy backup and storage device as part of the package.

Similarly, we've seen several High Performance Addressing dual-scan screens pass through our test center recently, but the LifeBook 280Dx's 12.1-inch HPA panel is the first to deliver on the industry's promise of enhanced performance. Its picture is free of the defects, shadows, bright spots, and cursor ghosting seen on standard dual-scan screens. Still, HPA screens can't be viewed from sharp angles and don't offer the brightness and contrast of an active-matrix screen.

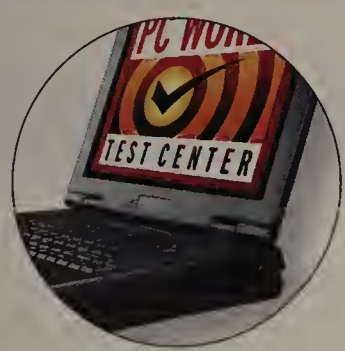
The LifeBook 280Dx's pointer is easy to use.

Sharply styled in dark gray with a downward sweep to the front edge, the 280Dx is a solid, roadworthy machine that exhibits no appreciable flex in either the case or screen panel. The keyboard is sturdily constructed with crisp-action keys for easy touch typing.

		EXPANDABILITY					CUSTOMER SUPPORT			
CD-ROM drive speed	Modem speed (kbps)	Maximum RAM (MB)	Modular expansion bays	Bay for second battery	Optional docking station	Infrared port	Warranty for parts/labor (years)	Weekday toll-free support (hours)	Weekend support	Online support
12X-20X	not included	128	1	●	●	●	3/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
not included	not included	96	1	●	●	●	3/3	24	Sat., Sun.	AOL, BBS, CIS, WWW
12X-24X	56 [2]	96	1	●	●	●	varies [3]/1	24	Sat., Sun.	BBS, CIS, WWW
8X-20X	56 [4]	128	0	●	○	●	1/1	13	Sat.	BBS, WWW
8X-20X	56 [2]	192	1	○	●	●	1/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
16X-20X	56 [4]	80	0	●	○	●	1/1	24	Sat., Sun.	BBS, WWW
12X-20X	56 [4]	96	2	●	●	●	1/1	24	Sat., Sun.	WWW
8X-20X	not included	160	0	○	●	●	1/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
12X-24X	56 [2]	144	1	●	○	●	1/1	24	Sat., Sun.	BBS, WWW
10X-24X	56 [2]	128	2	●	●	●	1/1	12	Sat.	BBS, WWW

[3] Five years on CPU and main RAM, one year on other parts. [4] Downloads only, uploads at 33.6 kbps; uses Rockwell-Lucent's K56flex technology.

The Ergotrac, a concave button that serves as the pointing device, is the notebook's most unusual feature. It requires less pressure than an eraserhead and is just as accurate.



The Enpower ENP-801 has great multimedia features.

The 280Dx's disadvantage is its traveling weight. At 8.2 pounds, the laptop is fine for short trips. But if you spend more than a little time on the road, two other chartmakers—the Acer Extensa 367D and the Gateway Solo 2500SE—are easier to carry. The 280Dx's battery life is also mediocre.

If the LifeBook 280Dx's well-written documentation fails to answer your questions, you can try Fujitsu's toll-free technical support, open around the clock. During our anonymous calls to Fujitsu, however, we waited an average of 10 minutes, which we consider too long, before talking with a support rep.

The one-year parts and labor warranty that comes with the LifeBook is what you'd expect with a budget notebook.

5 ENPOWER ENP-801

PRO: Multimedia features, great performance

CON: Bouncy keyboard, poor tech support policy

In a notebook market dominated by Intel processors, Enpower breaks rank by putting an AMD mobile chip in its ENP-801 notebook. We like the results.

With a PC WorldBench 98 score of 120, the AMD K6-266 notebook is as fast as the average Pentium MMX-266 laptop. Yet the ENP-801 costs $800 to $1200 less than its similarly configured Intel-powered counterparts on the power chart, the Compaq Armada 4220T and Micron GoBook 266.

At a smidgen over 9 pounds, the ENP-801 is best suited as a desktop replacement. However, with a battery life of almost 6 hours and room for a second power pack, it gives you enough power for the occasional trip.

The notebook comes in a sturdy, charcoal-gray case with two modular bays, located on the right-hand side, for maximum flexibility with components.

The ENP-801's impressive multimedia features include a bright 13.3-inch active-matrix screen and a MIDI game port, which isn't standard on most notebooks. For an extra $490 you can get a DVD-ROM drive (with an MPEG-2 decoder PC Card) instead of the 10X–24X CD-ROM drive. An optional $180 LS-120 SuperDisk drive or $99 Zip drive for backup and storage, as well as a second hard drive or battery, can fit into the floppy drive bay.

On the downside, the notebook's sound is tinny. The keyboard is also a problem: There's too much flex under the entire keyboard, as if it were supported by a trampoline. Some normally large keys, such as <Tab>, <Shift>, and the spacebar, are too small. Typing is an annoying experience, especially when you combine it with the ENP-801's recalcitrant pointer.

While the vendor's technical support hours are on the light side—12 hours a day and nothing on Sunday—the service is good. In our anonymous calls, the wait time was short and the tech support staffers were knowledgeable. ■

BEYOND THE TOP 10

We evaluated these systems along with the others, but they didn't score high enough to make it onto the Top 10 Notebook PCs chart. For write-ups, visit PC World Online (www.pcworld.com/top400).

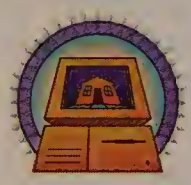
- Acer Extensa 710TE
- AMS Tech TravelPro 2500CS
- ARM Computer ARMNote TS759
- CTX International EzBook 770MSXJ
- Mega Image Apollo
- Toshiba Satellite Pro 490CDT
- WinBook XL 233

PC WORLD

TOP 10 HOME PCs

	POWER SYSTEM	Last month	Month tested	Street price (7/17/98)	Comments
1	Micron Millennia 400 888/634-8799 www.micronpc.com	1	Sept 98	$2373	**PRO:** Fastest home system yet, hefty hardware bundle, first-class reliability and service ratings. **CON:** Limited software package.
2	Dell Dimension XPS R400 800/388-8542 www.dell.com	2	Aug 98	$2872	**PRO:** Top-notch reliability and service ratings, improved setup instructions. **CON:** Expensive, comes with skimpy software package.
3	Gateway G6-400 800/846-2000 www.gateway.com	n/a	NEW	$2773	**PRO:** Second-fastest home system to date, huge hard drive, big monitor. **CON:** Somewhat pricey, documentation is inadequate for some software applications.
4	Quantex QP6/333 SM-4x SE 800/896-4898 www.quantex.com	5	May 98	$2099	**PRO:** Good speed at a great price ($150 lower this month), big monitor. **CON:** Mediocre setup documentation.
5	HP Pavilion 8290 800/724-6631 www.hp.com	n/a	Sept 98	$2898	**PRO:** Well-equipped system, first-rate setup instructions, multimedia keyboard. **CON:** Slow for a Pentium II-400, expensive.
	BUDGET SYSTEM				
1	Micron Millennia 266 888/634-8799 www.micronpc.com	1	May 98	$1698	**PRO:** Fast budget system, 17-inch monitor and Zip drive, first-class reliability and service ratings. **CON:** Pricey for a budget system.
2	Gateway G6-300h 800/846-2000 www.gateway.com	n/a	NEW	$1518	**PRO:** Very fast budget PC, great starter package, bundled color printer, nice selection of software. **CON:** Software documentation is insufficient for certain apps.
3	Quantex QP6/266 M-1x 800/896-4898 www.quantex.com	3	July 98	$1199	**PRO:** Decent performance for the price, good-size monitor. **CON:** Range of software titles is unimpressive, ease of setup is just so-so.
4	Compaq Presario 2254 800/345-1518 www.compaq.com	n/a	NEW	$1078 [1]	**PRO:** Very affordable, suitable as a starter PC or a second home system. **CON:** Sparse software bundle, slow, lacks power for handling demanding apps, very small monitor.
5	HP Pavilion 3265 800/724-6631 www.hp.com	5	Sept 98	$998	**PRO:** Super price, great for first-time PC owners, excellent setup documentation. **CON:** No secondary cache and minimal video RAM make it the slowest system on chart.

Best Buy n/a = not applicable [1] Manufacturer offers $100 rebate.



WHAT'S THE BIGGEST DIFFERENCE between a PC you use at home and one you use at work? For many, it's not the processor, the hard disk, or the bundled software. It's that you pay for the home computer with your own money. Sure, you might be tempted to skimp on features to save some cash—but remember, not all cheap systems are created equal. By saving a few bucks you may sacrifice things like performance or high-quality components.

Typically, budget systems fall into one of two classes: low-end PCs whose manufacturers usually (but not always) cut corners on components to push the price below $1300; or full-featured, formerly high-end PCs that have been displaced by the hottest new models and usually cost between $1600 and $1800.

Of the four new home machines we tested this month, three were cheap enough to please any skinflint. The $1518 Gateway G6-300h and the $1078 Compaq Presario 2254 snagged the second and fourth spots, respectively, on the budget list. However, a preproduction unit of the $1698 Monorail 8220 didn't score high enough to crack our chart, due to its bare-bones configuration and scanty software offering.

SUPER BUDGET DEALS

IF IT'S SPEED YOU CRAVE, note that three of this month's budget systems sport a Pentium II processor. The fastest one of the bunch—Gateway's G6-300h—even includes a color ink jet printer. Thanks to the introduction of its super-fast 350-MHz and 400-MHz systems (like the new G6-400, number three on the power list), Gateway has upgraded the G6-300h's processor from 266 MHz to 300 MHz. With a PC WorldBench 98 score of 167, the G6-300h is the fastest budget PC we've tested to date.

Gateway G6-300h

And the G6-300h is well equipped for a budget system. It has a 5GB hard disk—big enough for a busy home office or the whole family's data—a DVD-ROM drive, and Microsoft Home Essentials software package. Plus, you get Canon's BJC-4300 color ink jet printer, a $180 value. The only drawback is that at this price the G6-300h's monitor is a 15-incher. But for just a little over $1500, whadaya expect?

If you want it *all*—a bargain price, a big monitor, and speed—how about a basic PII-266 system with a 17-inch monitor for $1199? The QP6/266 M-1x from Quantex is a good platform for your home office. But it's slower than either Gateway's G6-300h or this month's budget Best Buy, Micron's Millennia 266. The QP6/266 M-1x's setup rating is also slightly

SCORECARD

★ Overall rating	PC WorldBench 98 score/rating	Price	Reliability/ support	Setup	Features	InfoNet number
86	209/outstanding	moderate	above average/ above average	good	Pentium II-400, 64MB of SDRAM, 10GB hard disk, 2X DVD-ROM drive, 56-kbps modem, 17-inch monitor, Iomega Zip drive, AGP graphics card.	680
83	199/outstanding	expensive	above average/ above average	good	Pentium II-400, 64MB of SDRAM, 14GB hard disk, 2X DVD-ROM drive, 56-kbps modem, 19-inch monitor, Turtle Beach Montego sound card, AGP graphics card.	681
79	205/outstanding	expensive	average/ above average	outstanding	Pentium II-400, 128MB of RAM, 14GB hard disk, 2X DVD-ROM drive, 56-kbps modem, 19-inch monitor.	682
76	163/good	inexpensive	average/ average	fair	Pentium II-333, 64MB of SDRAM, 6GB hard disk, 2X DVD-ROM drive, 56-kbps modem, 19-inch monitor, AGP graphics card.	683
75	174/good	expensive	average/ average	outstanding	Pentium II-400, 64MB of SDRAM, 12GB hard disk, 2X DVD-ROM drive, 56-kbps modem, 17-inch monitor.	684
Power scorecard weightings ▶	Performance 30 percent	Price 15 percent	R/S 40 percent	Setup 5 percent	Features 10 percent	
86	151/good	expensive	above average/ above average	good	Pentium II-266, 32MB of SDRAM, 6.4GB hard disk, 12X-32X CD-ROM drive, 56-kbps modem, 17-inch monitor, Iomega Zip drive, AGP graphics card.	685
85	167/outstanding	moderate	average/ above average	outstanding	Pentium II-300, 64MB of SDRAM, 5GB hard disk, 2X DVD-ROM drive, 56-kbps modem, 15-inch monitor, Canon BJC-4300 color ink jet printer.	686
83	141/good	inexpensive	average/ average	fair	Pentium II-266, 32MB of SDRAM, 3.2GB hard disk, 12X-32X CD-ROM drive, 56-kbps modem, 17-inch monitor, AGP graphics card.	687
83	118/poor	very inexpensive	average/ above average	outstanding	AMD K6-266, 32MB of SDRAM, 4GB hard disk, 12X-32X CD-ROM drive, 56-kbps modem, 14-inch monitor, PCI graphics card.	688
82	83/poor	very inexpensive	average/ average	outstanding	Pentium MMX-233, 32MB of SDRAM, 2.1GB hard disk, 12X-24X CD-ROM drive, 56-kbps modem, 15-inch monitor.	689
Budget scorecard weightings ▶	Performance 15 percent	Price 30 percent	R/S 40 percent	Setup 5 percent	Features 10 percent	All products: 905

inferior, and Quantex's reliability and service scores don't match the first-class ratings of top dog Micron.

THE $1000 PC

WANT TO SPEND EVEN LESS? You can certainly find systems from well-known manufacturers for about $1000, but they tend to skimp on components. These ultracheap PCs come with low-cost processors that sometimes lack secondary cache (causing performance to suffer), and they often have sound cards, video boards, and modems integrated right onto the motherboard. That could pose a problem if you want to upgrade the PC later by adding your own card. Still, one sub-$1000 PC—the HP Pavilion 3265—made it onto our chart this month. Also, the Compaq Presario 2254 costs just $978 after a rebate.

The AMD K6-266–based Presario 2254 is about 25 percent slower than Gateway's G6-300h or Micron's Millennia 266. And at this price, it comes with a tiny 14-inch monitor. Nevertheless, its superlow price tag and excellent setup rating place the Compaq Presario 2254 at number four on the budget chart. This system is great for basic tasks like home finance or surfing the Internet, although a larger display would allow for easier Web page viewing. It's a fine choice for first-time buyers on a tight budget.

In the same class as the Presario 2254 is HP's $998 Pavilion 3265, which we tested last month. Based on a Pentium MMX-233, it's 30 percent slower than even the Presario, and comes with a 2.1GB hard drive—about half the capacity of the Compaq's. Still, there's enough power for you and your kids to explore cyberspace, do homework, and manage your investment portfolio. And the Pavilion is a snap to set up, even for the novice.

Compaq Presario 2254

A word of caution: *PC World* has also tested machines equipped with Intel's Celeron CPU—a lower-cost, dumbed-down version of the Pentium II processor that lacks a secondary cache. This omission really hurts system performance. And the Celeron systems weren't all that inexpensive—they ranged from $1299 to $1699. Within the next month or two, we'll see newer and cheaper machines (selling for under $1300) featuring a faster Celeron chip that will have 128KB of secondary cache, which should bump up performance considerably.

My advice until then: Don't buy a Celeron machine if you can get a Pentium II system for the same price or less.

—*Kirk Steers*

Kirk Steers is a contributing editor for PC World. *Testing by Ulrike Diehlmann of the PC World Test Center.* ■

BEYOND THE TOP 10

online

We also evaluated the following system this month, but it did not score high enough to make the Top 10 Home PCs list. For a write-up, see PC World Online (www.pcworld.com/t10homepcs).

◆ **Monorail 8220**

PHOTOGRAPHS: KEN SMITH

FOR YOUR PROTECTION

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- Seven fun colors

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- Convenient six foot length
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- Great for business travelers

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- Impressive volume
- Half the weight of other cases
- Accommodates all size notebooks

It's estimated that over 350,000 unprotected notebook computers will fall victim to theft this year alone. Countless others will suffer some kind of damage. With the average notebook and its irreplaceable data worth tens of thousands of dollars, the numbers quickly become staggering. Help reduce the risk and protect your investment. Make sure every notebook you buy includes a Kensington Case and MicroSaver Security Cable. For more information, visit www.kensington.com and, as always, please practice safe computing.

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PC WORLD

TOP 10 PRINTERS

	MONOCHROME PERSONAL PRINTER	Month tested	Street price (7/1/98)	Overall rating	Speed for plain text (ppm)	Speed for full-page graphics (ppm)	Comments	InfoNet number
1	NEC SuperScript 870 800/632-4636 www.nec.com	NEW	$349	85	7	3.9	**FEATURES:** Laser, rated 8 ppm. Standard 2MB of RAM, 600-by-600-dpi maximum resolution, 150 sheets input, 100 output. **SUMMARY:** Fastest speeds on the chart, good text print quality, and user-friendly design launch this new model to the top. We do wish its gray-scale graphics were better, however.	690
2	Okidata OkiPage 6e 800/654-3282 www.okidata.com	June 98	$299	81	5.1	3	**FEATURES:** LED, rated 6 ppm. Standard 2MB of RAM, 1200-by-300-dpi maximum resolution, 100 sheets input and output. **SUMMARY:** Good print quality, small footprint, simple control panel design, and below-average price help make up for unexceptional speeds on both text and graphics.	691
3	NEC SuperScript 660plus 800/632-4636 www.nec.com	Dec 97	$249	80	5.2	3.3	**FEATURES:** Laser, rated 6 ppm. Standard 256KB of RAM, 600-by-600-dpi maximum resolution, 150 sheets input, 100 output. **SUMMARY:** Second-fastest graphics speed on the monochrome chart, inexpensive, and quiet; but documentation is inadequate and paper trays are somewhat fragile.	692
4	HP LaserJet 6Lse 800/752-0900 www.hp.com	Dec 97	$399	79	5.1	2	**FEATURES:** Laser, rated 6 ppm. Standard 1MB of RAM, 600-by-600-dpi maximum resolution, 100 sheets input and output. **SUMMARY:** Good print quality, design, documentation, and paper handling are undercut by high price and slow graphics speed (it ties for slowest text speed, too).	693
5	Lexmark Optra E+ 800/539-6275 www.lexmark.com	Feb 98	$399	79	5.4	1.6	**FEATURES:** Laser, rated 6 ppm. Standard 2MB of RAM, 600-by-600-dpi maximum resolution, 150 sheets input, 100 output. **SUMMARY:** High price and slowest graphics speed on chart are balanced by good documentation and better graphics quality than our Best Buy.	694
	COLOR PERSONAL PRINTER							
1	Lexmark 5700 Color Jetprinter 800/539-6275 www.lexmark.com	June 98	$249	81	2.8	0.4	**FEATURES:** Ink jet, rated 8 ppm monochrome/4 ppm color. 1200-by-1200-dpi maximum resolution, 100 sheets input, 25 output. **SUMMARY:** Fine print quality at a good price makes this quiet, easy-to-use printer our top choice, though its weak black ink can leave colors looking a bit flat.	695
2	Epson Stylus Photo 700 800/463-7766 www.epson.com	Aug 98	$279	80	1.4	0.5	**FEATURES:** Ink jet, unrated. 1440-by-720-dpi maximum resolution, 100 sheets input, 30 output. **SUMMARY:** Lovely print quality, especially with photographs on ink jet stock, but you pay for it in speed. The PhotoPC 600 digital camera can be plugged into it directly for easy photo printing.	–
3	Canon BJC-4400 800/652-2666 www.ccsi.canon.com	NEW	$199	79	2.1	0.3	**FEATURES:** Ink jet, rated 6.5 ppm monochrome/2.5 ppm color. 720-by-360-dpi maximum resolution, 100 sheets input and output. **SUMMARY:** Low price and great features compensate for midrange performance and middling print quality. Use a high-yield black cartridge for long-lasting text printing.	696
4	HP DeskJet 722C 800/752-0900 www.hp.com	Dec 97	$299	77	4.1	0.3	**FEATURES:** Ink jet, rated 5 ppm monochrome/1.5 ppm color. 600-by-600-dpi maximum resolution, 100 sheets input, 50 output. **SUMMARY:** Good printing on plain paper and impressive text speed keep this printer on the chart, despite disorganized documentation and lack of toll-free tech support.	697
5	Canon BJC-5000 800/652-2666 www.ccsi.canon.com	NEW	$279	77	2.3	0.3	**FEATURES:** Ink jet, rated 7.5 ppm monochrome/3 ppm color. 1440-by-720-dpi maximum resolution, 130 sheets input and output. **SUMMARY:** Good print quality and strong features land this new model a chart spot, but slower text speed and a more complicated design keep it below the HP DeskJet 722C.	698

Best Buy — Windows 95-certified Plug and Play — All products: 906

TEST PC WORLD CENTER

HOW WE TEST The overall rating for both monochrome and color personal printers is based on print quality (25 percent), price (25 percent), features (15 percent), speed (10 percent), service and support (10 percent), and ease of use (15 percent). For all ratings, higher is better. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

NEW PRINTERS that replace older models should top their predecessors, right? Well, sometimes that's not so. This month we tested four new printers, two of which supersede earlier versions of the same basic design. One of the replacements, the $349 NEC SuperScript 870 laser, improves markedly on its precursor, the SuperScript 860, and takes first place on the monochrome chart. But the other, the Canon BJC-4400 ink jet, ▶

costs more and doesn't improve on an earlier incarnation, the BJC-4300. In its day, the $179 BJC-4300 topped our color chart, though by the time it was discontinued it ranked third against fierce competition; the new $199 BJC-4400 starts in third place, against printers that have been around a while. Canon's other new ink jet, the $279 BJC-5000, doesn't replace anything, but it offers useful features and good print quality; it debuts at number five. Xerox's slow new $199 DocuPrint XJ6C doesn't succeed a similar model—nor does it succeed on our chart. (Our former number two, Epson's Stylus Color 800, is being replaced; we'll test its successor in December.)

NEC'S NEW SCREAMER

WITH THE SuperScript 870, NEC wins a Best Buy. (Our former Best Buy, the Minolta PageWorks 6L, is being replaced; we'll test the new model in January.) The SuperScript screams past the other monochromes in our benchmarks; its 7-pages-per-minute text speed is almost 30 percent faster than the next-fastest Lexmark Optra E+ (at 5.4 ppm). With a graphics speed of almost 4 ppm in our tests, it's 18 percent faster on this measure than the runner-up NEC SuperScript 660plus.

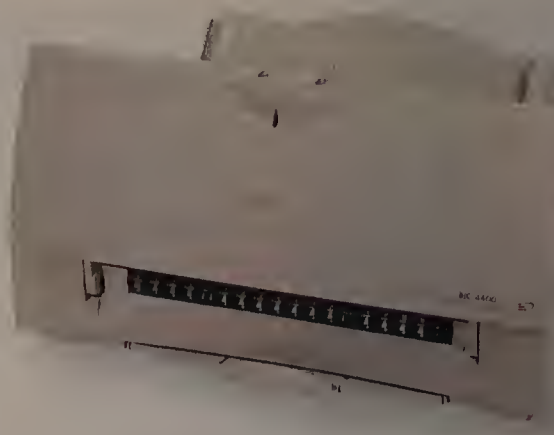
Besides being faster than the old SuperScript 860, the SuperScript 870 also offers better features (more RAM, higher paper capacity) and superior design (stronger paper trays). It costs the same as its forebear ($349), and it does a great job printing text, though its gray scales are too dark. Like its predecessor, the 870 is easy to set up: The separate imaging drum and toner cartridge install smoothly. Finally, the 870's CD-ROM includes five useful small business apps, including a project manager and a form designer; unfortunately, you can choose only one of these apps to load from the CD-ROM.

CANON BATS TWICE

WHY DID CANON replace the BJC-4300 with the BJC-4400? For $20 more, you get roughly the same printer. Canon claims that the new model is faster, but in our tests the two ran at nearly identical (midrange) speeds. Their print quality is also similarly adequate. On plain paper, you get slightly rough text, ho-hum grays, and detailed color. Both models print admirably on ink jet stock, but it's costlier.

The 4400 does improve on the older model in at least one way: An oversize black cartridge makes printing long text pages convenient and, remarkably, about 40 percent faster in our informal tests. As with the 4300, you can convert the 4400 to a scanner by adding a $99 scanhead.

Canon's other new printer, the BJC-5000, offers more flexibility than the 4400 thanks to a setup that can handle numerous cartridge combinations. For example, Canon claims that printing text with two black cartridges at a time is faster (we didn't test this). When we tested the printer with one black and one color cartridge, the 5000's speed matched the 4400's (though it's still slower than the number four HP DeskJet 722C). Its print quality exceeds the 4400's slightly, with dark, even text and realistic gray-scale and color images. On high-quality paper, it prints gorgeous graphics. It also supports 11- by 17-inch printing, one sheet at a time, through a slot at the back. This is awkward, but the BJC-5000 doesn't require you to remove the paper from the front tray, as other models do. One complaint: The BJC-5000 makes a racket.



WITH SPEED, QUALITY, and price similar to the model it replaces, the $199 Canon BJC-4400 hits our color chart at number three.

XEROX'S MISSTEP

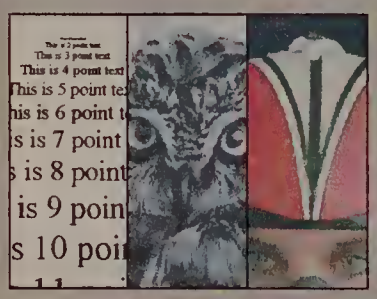
UNTIL NOW, Xerox had been wowing us with one stellar business printer after another—but its new personal model, the DocuPrint XJ6C, is no winner. This $199 ink jet prints text at less than half the speed of our Best Buy, Lexmark's 5700 Color Jetprinter. Its pallid black ink and shadowy type also disappoint, and color graphics look mediocre. The XJ6C's design scores low, too. Its U-shaped path curls paper, and you must remove the output tray to add paper to the input tray.

On the plus side, it comes with a long, three-year warranty. Its ink cartridges can be replaced one by one, so you won't discard a full tank, and its high-capacity cartridge would be great for text if the black were darker. If Xerox is going to play in the ink jet market, it'll have to do better.

—Dan Littman ■

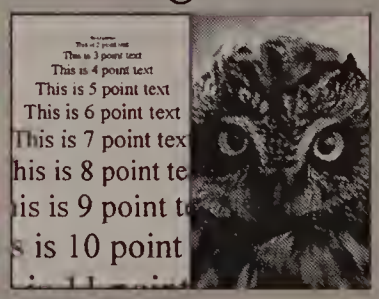
PRINT QUALITY SAMPLES

Readable Text Printing Needs Dark Black Ink



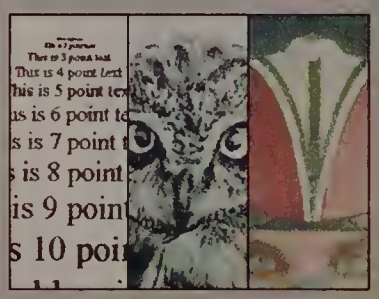
CANON BJC-5000

Dark, even text and realistic grays and color put Canon's new ink jet on the chart at number five. With two black cartridges installed, you can print text even faster.



NEC SUPERSCRIPT 870

We love the crisp, readable text from our new monochrome Best Buy, the NEC SuperScript 870, though its gray-scale graphics are too dark for our liking.

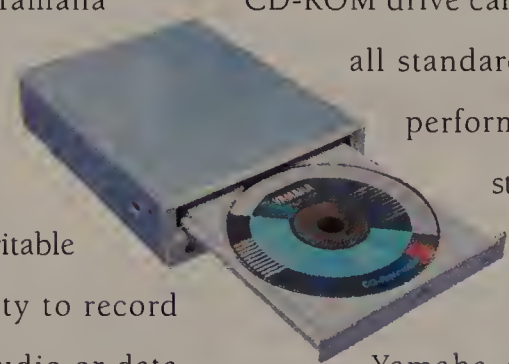


XEROX DOCUPRINT XJ6C

Shadowy type, pale black ink on both text and gray-scale images, and ho-hum (albeit passable) color prevent Xerox's newest ink jet from making our chart.

Storage for the Masses

Compact Disc is the standard media of the business desktop with over 300 million CD-ROM drives in homes and offices worldwide. Now, Yamaha makes CD's mass appeal even more appealing to business — by making CDs ReWritable. Yamaha CD ReWritable drives give you the capacity to record up to 650Mb of video, audio or data on a single CD-RW disc — and the flexibility to erase and rewrite any part of the disc for revisions and backups. The same CD-RW drive also records CD-R write-once discs that every CD-ROM drive can read. It speed-reads all standard CD formats. And it performs like a Yamaha—the standard of quality in CD recording accuracy and reliability. Let Yamaha CD-RW drives be your business standard. Visit our Web site for a dealer near you.



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VELOCITY 4400	1670
VIPER V550	1490
Monster 3D II	1120
Millennium G-200	1100

Viewperf CDRS-03††

VELOCITY 4400	42
FireGL 1000 Pro	25
Xpert@Work	18
G-200	12

High End WinMark '98*†

VELOCITY 4400	290
Millennium G-200	260
FireGL 1000 Pro	251
ATI Xpert@Work	205

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PC WORLD

TOP 10 MONITORS

	17-INCH MONITOR	Month tested	Street price (7/10/98)	Overall rating	Quality of text/graphics	Comments	InfoNet number
1	IBM P72 800/426-7255 ext. 4753 www.pc.ibm.com/us/accessories/monitors	retested this month	$589	89	excellent/excellent	**FEATURES:** 15.7-inch viewable area, .25mm stripe pitch Trinitron tube, up to 85-Hz refresh rate,[1] Plug and Play ready,[2] TCO'95 compliant, three-year warranty, 24-hour toll-free support. **SUMMARY:** Lovely colors and ultracrisp text keep this model ahead, despite its steep price. It also features a wide array of on-screen controls.	–
2	Mitsubishi Diamond Pro 87TXM 800/843-2515 www.mitsubishi-display.com	retested this month	$539	88	very good/very good	**FEATURES:** 15.7-inch viewable area, .25mm stripe pitch Diamondtron tube, up to 107-Hz refresh rate,[1] Plug and Play ready,[2] TCO'95 compliant, three-year warranty, 12-hour weekday toll-free support. **SUMMARY:** Perennial chartmaker is somewhat expensive but has sophisticated controls and excellent features.	621
3	TeleVideo SVP270 800/835-3228 www.televideoinc.com	retested this month	$479	88	very good/excellent	**FEATURES:** 15.7-inch viewable area, .25mm stripe pitch Diamondtron tube, up to 119-Hz refresh rate,[1] Plug and Play ready,[2] TCO'95 compliant, three-year warranty, 12-hour weekday toll-free support. **SUMMARY:** Luscious colors and a high refresh rate zoom this unit up the chart, but support hours are somewhat limited.	622
4	Samsung SyncMaster 700p Plus 800/933-4110 www.sosimple.com	retested this month	$449	88	very good/very good	**FEATURES:** 15.6-inch viewable area, .26mm dot pitch tube, up to 100-Hz refresh rate,[1] Plug and Play ready,[2] TCO'95 compliant, three-year warranty, 24-hour toll-free support. **SUMMARY:** Handsome model displays realistic graphics, but text score drops a bit from last month and icons for menu controls are hard to decipher.	623
5	AcerView 79g 800/379-2237 ext. 125 www.acerperipherals.com	retested this month	$449	86	very good/excellent	**FEATURES:** 15.5-inch viewable area, .25mm stripe pitch Diamondtron tube, up to 118-Hz refresh rate,[1] Plug and Play ready,[2] TCO'95 compliant, three-year warranty, 24-hour toll-free support. **SUMMARY:** Vibrant colors and high refresh rate make up for small viewable area and a lack of some advanced controls.	624
6	ViewSonic PT775 800/888-8583 www.viewsonic.com	retested this month	$649	86	very good/excellent	**FEATURES:** 15.9-inch viewable area, .25mm stripe pitch Diamondtron tube, up to 117-Hz refresh rate,[1] Plug and Play ready,[2] TCO'95 compliant, three-year warranty, 11-hour weekday toll-free support. **SUMMARY:** Stunning graphics and an $80 price cut move this fine model up a bit, but it has the shortest support hours here.	625
7	Iiyama VisionMaster Pro 400 800/394-4335 www.iiyama.com	retested this month	$499	86	very good/very good	**FEATURES:** 15.7-inch viewable area, .25mm stripe pitch Diamondtron tube, up to 115-Hz refresh rate,[1] Plug and Play ready,[2] TCO'95 compliant, three-year warranty, 12-hour weekday toll-free support. **SUMMARY:** Equally good text and graphics compensate for generic design. On-screen controls take some time to master.	626
8	Apple MultipleScan 720 800/889-2629 www.apple.com	NEW	$449	83	good/good	**FEATURES:** 15.7-inch viewable area, .28mm dot pitch tube, up to 85-Hz refresh rate,[1] Plug and Play ready,[2] TCO'95 compliant, one-year warranty, 12-hour weekday toll-free support. **SUMMARY:** Intuitive controls and well-designed documentation help this unit grab a spot, but warranty is the chintziest here.	627
9	Mitsubishi DiamondScan 70M 800/843-2515 www.mitsubishi-display.com	NEW	$419	83	good/good	**FEATURES:** 15.9-inch viewable area, .28mm dot pitch microfilter tube, up to 85-Hz refresh rate,[1] Plug and Play ready,[2] TCO'95 compliant, three-year warranty, 12-hour weekday toll-free support. **SUMMARY:** Has a low price, compact design, and built-in speakers, but image quality lags, and control settings aren't intuitive.	628
10	Panasonic PanaFlat PF70 800/742-8086 www.panasonic.com/alive	retested this month	$679	82	very good / excellent	**FEATURES:** 15.6-inch viewable area, .24mm slot pitch tube, up to 106-Hz refresh rate,[1] Plug and Play ready,[2] TCO'92 compliant, three-year warranty, 24-hour toll-free support. **SUMMARY:** Rendered colors look great on this model, but text screens appear concave at first, and price tag is the highest on chart.	629

Best Buy online For reviews of products that didn't make the chart, visit www.pcworld.com/t10monitors. All products: 901

TEST PC WORLD CENTER

HOW WE TEST Ten judges rate a monitor's text and graphics quality. We evaluate each unit on how well it displays typical business letters, a newsletter, spreadsheets, Web pages, and scanned images. The overall rating is based on text and graphics quality (25 percent each), features and ease of use (25 percent), price (20 percent), and service and support (5 percent). The best possible overall rating is 100. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

[1] Highest refresh rate at 1024 by 768 resolution. [2] Plug and Play monitors and graphics cards can communicate bidirectionally. However, Windows 95 does not fully utilize monitor Plug and Play.

AFTER WE RETESTED 17-inch monitors for this month's roundup (see page 117), IBM's P72 emerged with the Best Buy crown. Though somewhat pricey, it's the only monitor here to garner excellent scores on both text and graphics. With very good image quality, Mitsubishi's Diamond Pro 87TXM claims second. Our previous top Best Buy, Iiyama's VisionMaster Pro 17, was replaced by the VisionMaster Pro 400, which didn't do as well. ■

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TOP 10 GRAPHICS BOARDS

	PCI BOARD	Month tested	Street price ($/3/9B)	Overall rating	Mixed-media business rating	3D rating	Features rating	Comments	InfoNet number
1	STB Velocity 128 888/234-8750 www.stb.com	Aug 98	$99	82	average	average	good	**FEATURES:** 4M8 of SGRAM, 230-MHz RAMDAC, NVidia Riva 128 chip, bundled 3D games and 3D modeling program. **SUMMARY:** The Velocity 12B is a good low-cost option for users who like to dabble in a little of everything.	699
2	Real 3D StarFighter PCI 800/393-7730 www.real3d.com	Aug 98	$230	82	average	excellent	average	**FEATURES:** 24MB of SGRAM (includes 16MB dedicated texture RAM), 220-MHz RAMDAC, Intel740 chip, bundled 3D games and 3D modeling program. **SUMMARY:** It's terrific in 3D and costs $20 less, but dropped a notch due to shorter support hours.	700
3	Diamond Viper V330 800/468-5846 www.diamondmm.com	Aug 98	$120	79	average	good	average	**FEATURES:** 4MB of SGRAM, 230-MHz RAMDAC, NVidia Riva 12B chip, bundled 3D games and tools for VRML authoring and photo editing. **SUMMARY:** A good buy overall, but couldn't run our PowerPoint test with 30 plug-ins due to a driver bug.	701
4	Intergraph Intense 3D Voodoo 800/763-0242 www.intergraph.com/ics	Aug 98	$99	78	average	excellent	average	**FEATURES:** 6MB of EDO DRAM (includes 2MB dedicated texture RAM), 220-MHz RAMDAC, Alliance ProMotion chip and 3Dfx Voodoo Rush chip, bundled 3D games. **SUMMARY:** Low-cost option for gamers with its $100 price cut, but no weekend support.	702
5	Hercules Thriller 3D 800/532-0600 www.hercules.com	Aug 9B	$99	78	average	excellent	below average	**FEATURES:** 4M8 of SGRAM, 230-MHz RAMDAC, Rendition Verite V2200 chip, no bundled software. **SUMMARY:** The Thriller 3D is affordable, fast in 3D, and adequate for standard business use. Hercules, however, doesn't offer weekend support.	703
	AGP BOARD								
1	Matrox Millennium G200 800/844-8305 www.matrox.com/mga	NEW	$149	92	excellent	excellent	excellent	**FEATURES:** 8MB of SGRAM, 250-MHz RAMDAC, MGA-G200 chip, bundled 3D modeling tool and image editing app. **SUMMARY:** Great speed and 3D image quality make this board a very strong candidate for the office and for after-hours gaming.	704
2	STB GlyderMax-2 888/234-8750 www.stb.com	NEW	$99	91	excellent	good	good	**FEATURES:** BMB of SGRAM, 230-MHz RAMDAC, 3Olabs Permedia 2 chip, bundled 3D games and VRML creator. **SUMMARY:** The GlyderMax-2 is a good pick for the office. It does a nice job with business graphics apps and with 3D games.	705
3	STB Velocity 128zx 888/234-8750 www.stb.com	Sept 98	$149	89	good	excellent	good	**FEATURES:** 8MB of SGRAM, 250-MHz RAMDAC, NVidia Riva 12Bzx chip, bundled 3D games and VRML creator. **SUMMARY:** This board is a good option for home users. It handles 3D games well, and its TV-out port can connect to a big-screen TV.	706
4	Real 3D StarFighter AGP 800/393-7730 www.real3d.com	Aug 98	$90	85	good	good	average	**FEATURES:** 8M8 of SGRAM, 220-MHz RAMDAC, Intel740 chip, bundled 30 games and 3D modeling program. **SUMMARY:** It's the cheapest AGP board here, thanks to a $10 cut, but it lacks a software zoom utility, and support hours dropped slightly.	707
5	Diamond Stealth II G460 800/468-5846 www.diamondmm.com	Aug 98	$130	85	good	excellent	average	**FEATURES:** 8MB of SDRAM, 203-MHz RAMDAC, Intel740 chip, bundled 3D games, and 3D animation and 3D visualization software. **SUMMARY:** The G460 is a nice option for most tasks, but it lacks a software zoom utility, and support isn't toll-free.	708

Best Buy — For reviews of products that didn't make the chart, visit www.pcworld.com/t10graphics. — All products: 907

PC WORLD TEST CENTER **HOW WE TEST** We test boards under Windows 95. Business tests include PC WorldBench 98, a PowerPoint test, and a Macromedia Director script. Our 3D score is based on four games, each evaluated on frame rate and image quality. For AGP cards, we add a texturing test using Caligari's TrueSpace3. PCI boards were tested in a Micron Millennia Mme with a Pentium MMX-233 and 32MB of RAM. AGP boards were tested in an NEC Direction 333 with a PII-333 and 64MB of RAM. Overall rating is based on performance (PCI 50 percent, AGP 55 percent), features (25 percent), price (PCI 15 percent, AGP 10 percent), and support policies (10 percent). For all scores, higher is better. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

TWO NEW AGP graphics boards barge onto this month's chart. Matrox's Millennium G200 seizes the Best Buy due largely to its knockout 3D and mixed-media business performance. For $50 less, consider STB's new GlyderMax-2, which snaps up the number two position thanks to fine overall performance. We also tested new boards from Cornerstone and Hercules, which missed our list due to so-so performance and skimpy features, respectively. ■

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PC WORLD

TOP 10 MODEMS

	EXTERNAL MODEM	Month tested	Street price (7/24/98)	Overall rating	V.34 transfers/ 56-kbps downloads (min:sec per MB)	Comments	InfoNet number
1	Zoom FaxModem 56Kx Dualmode 800/631-3116 www.zoomtel.com	retested this month	$119	82	2:31/3:10	**FEATURES:** Supports V.90 and K56flex, MNP-10EC error control protocol, 01 Communicate software. **SUMMARY:** This inexpensive and easy-to-install modem now supports the V.90 56-kbps standard and sells for $20 less than its predecessor—two factors that help it nab the top spot this month.	709
2	3Com U.S. Robotics 56K Faxmodem 800/342-5877 www.3com.com	June 98	$149	81	2:43/2:54	**FEATURES:** Supports V.90 and x2, distinctive ring, manual volume control, Caller ID, RapidComm software. **SUMMARY:** Great 56-kbps speed, a lifetime warranty, and a $31 price drop keep this peppy external modem near the top of the chart. But it has neither voice features nor toll-free support.	710
3	3Com U.S. Robotics Courier V.Everything 800/638-3266 www.3com.com	retested this month	$216	80	2:24/2:58	**FEATURES:** Supports V.90 and x2, distinctive ring, manual volume control, password protection, callback security, QuickLink II fax/data software. **SUMMARY:** It's the priciest model on the chart, but security features such as modem-level password protection and callback make it your best choice among corporate modems.	711
4	Archtek SmartLink 5634TS 888/912-9800 www.archtek.com	retested this month	$109	80	2:39/2:53	**FEATURES:** Supports V.90 and x2, MNP-10EC, V.80, distinctive ring, voice mail, speakerphone, VoiceView, ASVD, Caller ID, QuickLink Message Center software. **SUMMARY:** With a firmware update, Archtek's low-cost external voice modem is 24 seconds per megabyte faster on 56-kbps downloads than it was in August.	712
5	E-Tech Cyber Bullet E56RVP 888/609-8885 www.e-tech.com	Apr 98	$119	79	2:42/3:13	**FEATURES:** Supports K56flex, V.80, distinctive ring, voice mail, speakerphone, ASVD, serial cable, earphones, SuperVoice fax/data software. **SUMMARY:** A $10 price cut, plenty of features, and toll-free support are partially offset by subpar documentation and lackluster performance on 33.6-kbps transfers.	713
6	Shark Multimedia Leopard XT-56K 800/800-3321 www.sharkmm.com	Feb 98	$110	78	2:34/3:08	**FEATURES:** Supports K56flex, distinctive ring, voice mail, speakerphone, VoiceView, ASVD, manual volume control, serial cable, Caller ID, DialTone software. **SUMMARY:** Low-cost, full-featured modem performs well with 33.6-kbps transfers. But Shark will upgrade to V.90 for free only if it can be done through software.	714
7	Diamond Multimedia SupraExpress 56e 800/468-5846 www.diamondmm.com	Oct 97	$129	78	2:39/3:05	**FEATURES:** Supports K56flex, V.80 videoconferencing, serial cable, COMit and FaxTalk software. **SUMMARY:** Affordable modem performed well on our 56-kbps tests and is backed by long support hours (including Saturdays). But a V.90 upgrade is free only if it can be done through software.	715
	PC CARD MODEM						
1	3Com Megahertz 56K Cellular-Capable PC Card Modem 800/638-3266 www.3com.com	retested this month	$199	82	2:27/2:51	**FEATURES:** Supports V.90 and x2, cellular connectivity, voice mail, speakerphone, Caller ID, digital line voltage protection, pop-out phone jack, RapidComm software. **SUMMARY:** Firmware upgrade bumps this model from third place to first. It now comes with V.90, better performance, and a $70 price reduction.	716
2	TDK Global Freedom 5660 800/999-4835 www.tdksystems.com	Aug 98	$199	80	2:34/3:10	**FEATURES:** Supports K56flex, MNP-10EC, distinctive ring, voice mail, Caller ID, digital line voltage protection, QuickLink Message Center software. **SUMMARY:** Rich features, $30 price cut, and speedy 33.6-kbps performance compensate for substandard support and software-only V.90 upgrade policy.	717
3	Hayes Accura 56K Flash PC Card 800/377-4377 www.hayes.com	NEW	$148	78	2:39/3:07	**FEATURES:** Supports V.90 and K56flex, V.80 videoconferencing, Phone Toll software. **SUMMARY:** Basic modem lacks voice features but did relatively well in our 56-kbps download tests. It costs $31 less than its K56flex-only predecessor and is $51 cheaper than the other two PC Card offerings on the chart.	718

Best Buy For reviews of products that didn't make the chart, visit www.pcworld.com/t10modems. All products: 908

TEST PC WORLD CENTER **HOW WE TEST** We test V.34 (limited to 33.6 kbps) modem-to-modem performance using two identical modems on a Telecomm Analysis Systems simulated phone network. It sends a text file over 55 line conditions, and a mix of four files—graphics, text, program, and compressed files—over one line condition. For our x2 or K56flex tests, we call a local Internet service provider and transfer .jpg, .doc, and .zip files continuously for 18 hours. TAS transfers are faster than ISP downloads because files used in the latter are less compressible. Results for the two tests are not comparable. We currently do not test 56-kbps V.90 modem performance due to lack of ISP support. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

PRICE DROPS RESHUFFLE the chart this month—3Com's Megahertz 56K Cellular-Capable PC Card, for example, now costs $70 less. Among external modems, only 3Com's Courier sells for over $200. And for the first time, most of these modems support V.90. Both of our new Best Buys this month, Zoom's 56Kx external modem and 3Com's Megahertz, come with V.90 and boast higher speeds and lower prices than their predecessors. ■

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Presentations That *Really Work*

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If you've been following our series, by now you know all about the technical aspects of creating and delivering riveting presentations with LCD technology. In this installment, we'll cover the human angle with tips on organizing your thoughts and including the kind of information that will make a lasting, persuasive impression on your audience. And then to help bring your message home, we'll also give you an overview of some of the hottest projectors on the market.

Take a deep breath.

Fear of public speaking has been on humankind's top ten list since day one. If you're like most of us, that's a reality you'll have to confront. The best way to make it easy on yourself is to know your subject thoroughly, be familiar with the profile of your audience, and be well prepared. Reading some broad, extra-curricular materials on the subject matter (in other words, background information not directly related to your company's sales pitch) and doing a little bit of research on your audience will allow you to present your subject with confidence. Ultimately, that will help you "sell" your ideas more effectively.

Organize.

Having concise, well-organized content is half the battle. Determine the One Thing you want to achieve and keep it top of mind during the preparation and delivery of your presentation. Even if your subject is complex, try to develop a simple theme that you can return to from time to time to emphasize that One Thing underlying your well-crafted

speech and graphics. As with all effective presentations, organize yours simply and logically.

Use variety to support your points.

People react to various kinds of information differently. Some prefer hard facts and cold statistics, while others find emotional appeals and personal anecdotes more compelling. Don't rely on what works best with you personally when selecting your supporting information. Instead, in order to increase your chances of hitting the right chord with as many members of your audience as possible and enhancing your persuasive powers, be sure to mix up the kinds of supporting "evidence" you use.

Here is a menu of support tactics to choose from—be sure include a healthy mix in your presentation:

Statistics—Statistics are particularly effective when they shock. Use them for dramatic impact, especially when they point to an unexpected, surprising conclusion that may shake up the listeners' assumptions. If your presentation is about finance, or is directed at a financially oriented audience such as accountants, use statistics liberally.

Endorsements—Citing supporting comments from recognized experts can give your argument added credibility, particularly with academic and technical audiences. Try to use expert opinion from sources with which the audience is familiar; having to clarify credentials will waste time and weaken the impact. If that's not possible, use highly relevant testimonials. But be sure not to overuse this tactic—it may be misinterpreted as an indication that you lack your own substantive evidence.

Demonstrations—A live video or multimedia demonstration can explain a complex idea or process much faster than words alone. This holds particularly true with technical innovations such as software. But beware of the pitfalls. Make sure that others participating in your demo know exactly what's expected of them (and when) and test and retest your equipment (remember Bill Gates at the rollout demo for Windows 98?).

Analogies—Use analogies to help your audience relate to abstract ideas or subjects with which they are unfamiliar. When you tell them what something is like, their minds will fill in the blanks to make the connection.

Facts—If your time is limited, and your audience is high-level and impatient, rely on plenty of facts to get your point across. People who are used to getting "big-picture" briefings and making quick decisions based upon them prefer a logical, rapid recitation of "just the facts."

Exhibits—A well-crafted exhibit can enhance your presentation and increase your likelihood to persuade. This works particularly well when you're selling an idea for a project or product that does not yet exist and whose very existence depends on your ability to sell it. Get your audience involved physically and let them handle an architectural model of that building or restaurant you're planning.

Polaroid Polaview 315

Experience—Relaying personal experience and anecdotes is most effective when used with an audience of peers who understand your business. Your peer group is more likely to have had similar experiences and more apt to relate to and be drawn in by your personal testimony.

Putting it all together: Tips from the pros.

Who better than sales and marketing professionals to know the ins and outs of giving convincing presentations? From among that group, we've assembled an especially seasoned panel of experts who not only make countless presentations—they make them using the very same projectors that they are trying sell in the presentation. Not surprisingly, they have some insider tips to share.

Humor them. Marketing Manager Clint Hoffman of Sony has given hundreds of presentations to resellers and corporate buyers touting the advantages of his company's LCD solutions. To get the audience on your side, he recommends incorporating elements of surprise and humor into the program. "One of my most successful moments

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on the road came during a presentation for a new product rollout a few months back," reports Hoffman. In the early course of that presentation, Hoffman went through a brief, predictable slide sequence building up the new projector's features and benefits, preparing to move in for the sale. Then he broke the ice. "And best of all," he said, "the price is very, very small." At that point he projected the suggested list price in tiny, six point type in front of the large audience. Not only did he get a big laugh, he also made a memorable impression about the affordability of the new system.

Work on chemistry.

Presentations can be very unpredictable. And one of the elements that's hardest to control is the chemistry between and audience and presenter. "I've given the exact same presentation to different audiences and have gotten an entirely different reaction," observes James Chan, Product Marketing Manager for ViewSonic. The difference, he believes, is having a good rapport with the audience. "It's very intangible, and there are no surefire ways to guarantee you'll connect with the group. If you're well prepared and have done a good job setting up, you'll be more comfortable. And if the topic is something you're both truly interested in, that will make the audience more relaxed and help keep everybody in the room from feeling like they're 'just doing their job'," says Chan. Make it short, concise, and exciting. And work hard to create good chemistry from the start by getting the audience involved. For instance, when Chan is beginning his presentation to resellers, he often asks: "Can somebody help me set up?" Once he gets a volunteer from the audience, it quickly becomes apparent that the projector he's using—ViewSonic's PLJ802—requires no significant set up. That's because his presentation is

BUYERS' GUIDE

Here is a representative sampling of LCD projectors offered by some of today's leading brands. The most common, typical specifications used for comparing projectors are included. When it comes to comparing LCD projectors by their weight, keep in mind how the projector is most likely to be used. If road presentations will be the most common use, look for an ultra-portable (usually defined as 10 pounds or less) or portable model (generally in the 10 to 22 pound range). For a super-bright conference room solution, look into fixed-installation projectors. Weighing in at 30 to 50 pounds, the fixed-installation models are often the brightest you can find. All prices are the manufacturers' suggested list price.

Epson

Model **PowerLite 7300**
Technology **3-panel polysilicon LCD**
Resolution **XGA**
Brightness **1200 ANSI lumens**
Weight **13.8 lbs.**
Price **$14,999**

Epson PowerLite 7300

Model **PowerLite 7000XB**
Technology **3-panel polysilicon LCD**
Resolution **XGA**
Brightness **650 ANSI lumens**
Weight **14.7 lbs.**
Price **$11,999**

Model **PowerLite 5000XB**
Technology **3-panel polysilicon LCD**
Resolution **SVGA**
Brightness **750 ANSI lumens**
Weight **14.5 lbs.**
Price **$8,499**

Model **PowerLite 5500C**
Technology **3-panel polysilicon LCD**
Resolution **SVGA**
Brightness **650 ANSI lumens**
Weight **9.4 lbs.**
Price **$7,499**

Model **ELP 3500**
Technology **3-panel polysilicon LCD**
Resolution **VGA**
Brightness **650 ANSI lumens**
Weight **14.8 lbs.**
Price **$5,899**

Philips

Model **LC4750G**
Technology **3-panel polysilicon LCD**
Resolution **XGA**
Brightness **750 ANSI lumens**
Weight **17.5 lbs.**
Price **$7,999**

Model **LC4650G**
Technology **3-panel polysilicon LCD**
Resolution **SVGA**
Brightness **850 ANSI lumens**
Weight **17.5 lbs.**
Price **$6,750**

Model **LC4600G**
Technology **3-panel polysilicon LCD**
Resolution **SVGA**
Brightness **500 ANSI lumens**
Weight **17.5 lbs.**
Price **$4,499**

(continued on next page)

Philips LC4750G

YOU'VE GOT TO SEE IT IN **EPSON** COLOR.

HERE YOU SEE HER EVERY GOLDEN STRAND OF HAIR.

HERE YOU SEE THE PROJECTOR THAT WEIGHS LESS THAN SHE DOES.

Just like her, this incredible projector can easily hold an audience. Because instead of having only one imaging processor like other ultraportables, the PowerLite™ 5500C was born with three – for the brilliance of a large projector, without the bulk. In fact, at 650 ANSI lumens and only 9 1/2 pounds, this little baby will have everyone going ga-ga.

Epson PowerLite 5500C

THE NEW POWERLITE 5500C ULTRAPORTABLE PROJECTOR. 3 LCDs BRIGHT - 9 1/2 LBS LIGHT.

Epson®, the world leader in high-performance portable projectors, brings you a full-featured ultraportable with: Exclusive SizeWise™ technology that allows compatibility with computer resolutions up to 1024 x 768 • Zoom lens, remote control and amazing SRS 3D sound • Dedicated phone support and RoadService exchanges, usually within 24 hours.

For more information or a free video on Epson's award-winning line of projectors, call 1-800-442-1977 (ask for Oper. 3102) or visit www.epson.com.

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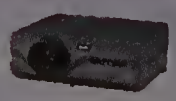
Everyone in favor of a lighter projector raise your hands.

Until now, most LCD projectors worth their weight in lumens were just too heavy to take along. Allow us to present the new VPL-SC50U Ultra Personal™ Projector. It weighs only 8.2 pounds, yet delivers 500 ANSI lumens of brightness and the image quality you would expect from Sony. Of course its strong, compact magnesium body, true SVGA resolution, and 3 year warranty* also help make this the LCD projector to pack, if you want your presentation to pack a punch.

VPL-SC50U
Ultra Personal Projector

SONY

For more information and your FREE Interactive Guide to Effective Presentations CD-ROM, call 1-800-472-7669, ext.SC50.
www.sony.com/sc50



VPL-X600U/S600U
Desktop Projectors

VPL-S800U
Installation Projector

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loaded as a JPEG file on a PC card, thus eliminating the need to bring along and connect a notebook computer to the projector. All his volunteer has to do is insert the PC card in the projector, and they're ready to go. This gets a little chuckle from the crowd, and simply and effectively demonstrates one of the projector's key selling points.

Get them involved. Craig Armstrong, Polaroid Digital Products National Sales Manager, is a strong believer in the impact that LCD technology adds to a presentation. Nevertheless, he recognizes that the LCD medium is not the message. "LCD projectors are great because they allow you to incorporate audio, video, and transitions that help keep the audience interested. But if your content doesn't actually teach them something, all the effects in the world will not persuade them and bring them over to your side," notes Armstrong. In fact, he cautions, too many effects can detract: "If you get too fancy with the effects and overuse them, the audience will end up focusing on the technology and not the message. The last thing you want at the end of a presentation is somebody coming up to ask how you did it—instead of asking about what you're selling or proposing." To connect with his audience, Armstrong makes every effort to tailor the content of his presentation to make sure it's relevant to the group. "If you can teach them something new and get them to participate, you'll be much more effective. Otherwise you're just talking to yourself," he concludes.

Make sure it's a road warrior.

When it comes to finding a great travel companion, not all LCD projectors are created equal. To optimize the comfort and ease of giving effective presentations on the road, you'll want a machine that strikes a good balance of these attributes:

Size and Weight—Projectors generally range from a little under ten pounds to upwards of 30 pounds. If you're a frequent flyer, often laden with other baggage, you'll probably want to be on the light side (those in the know consider 15 pounds and under to be the best for portability). As well, make sure that the dimensions of your machine are compatible with airline overhead

Sanyo PLC-9000N

BUYERS' GUIDE

(continued)

Philips (continued)

Model **LC4100G**
Technology **1-panel LCD**
Resolution **SVGA**
Brightness **300 ANSI lumens**
Weight **17.5 lbs.**
Price **$3,499**

Model **LC4600B**
Technology **3-panel polysilicon LCD**
Resolution **VGA**
Brightness **650 ANSI lumens**
Weight **17.5 lbs.**
Price **$5,499**

Polaroid Polaview 215

Polaroid

Model **Polaview 330**
Technology **3-panel polysilicon LCD**
Resolution **XGA**
Brightness **700 ANSI lumens**
Weight **13.5 lbs.**
Price **$9,995**

Model **Polaview 315**
Technology **3-panel polysilicon LCD**
Resolution **XGA**
Brightness **600 ANSI lumens**
Weight **21.5 lbs.**
Price **$8,995**

Model **Polaview 211E**
Technology **3-panel polysilicon LCD**
Resolution **SVGA**
Brightness **650 ANSI lumens**
Weight **21.6 lbs.**
Price **$5,595**

Model **Polaview 215**
Technology **3-panel polysilicon LCD**
Resolution **SVGA**
Brightness **400 ANSI lumens**
Weight **12.6 lbs.**
Price **$4,995**

Sanyo

Model **PLC-9000N**
Technology **3-panel polysilicon LCD**
Resolution **XGA**
Brightness **1600 ANSI lumens**
Weight **37 lbs.**
Price **$15,995**

Model **PLC-8810N**
Technology **3-panel polysilicon LCD**
Resolution **XGA**
Brightness **600 ANSI lumens**
Weight **13 lbs.**
Price **$11,995**

Model **PLC-5500NA**
Technology **3-panel polysilicon LCD**
Resolution **SVGA**
Brightness **550 ANSI lumens**
Weight **16 lbs.**
Price **$9,995**

Model **PLC-5600N**
Technology **3-panel polysilicon LCD**
Resolution **SVGA**
Brightness **700 ANSI lumens**
Weight **13 lbs.**
Price **$9,995**

(continued on next page)

FastTrack Schedule

has long provided ***powerful project planning*** and monitoring capabilities, and this upgrade polishes those capabilities and adds real-time collaboration tools.
PC Magazine, May 5, 1998

The latest edition improves the ***ease-of-use and power*** *of existing functions like setting up schedules,* allocating resources, calculating cash flow . . . .
Fortune, Technology Buyer's Guide, Winter 1998

...easy to learn and use, **and offers considerable** ***control*** **over even the most complex undertakings.**
PC Computing, May, 1998

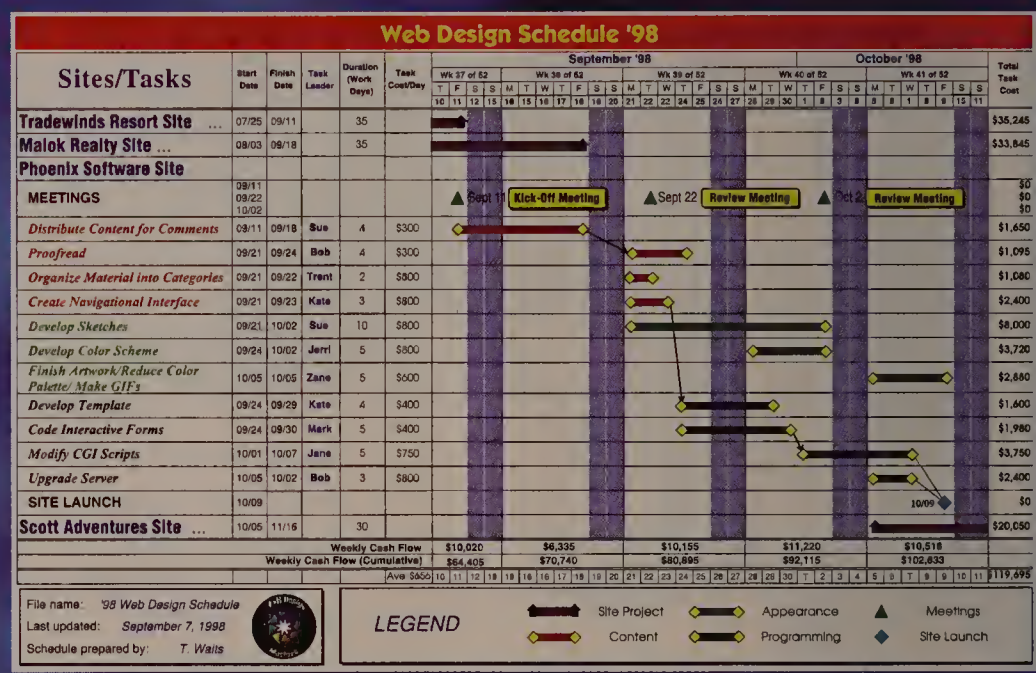
The program's **Strength** *lies in its flexible layout and presentation tools.*
Info World, April 6, 1998

. . . a good bet for companies that are looking for basic but ***easy-to-configure*** project scheduling.
PC Week, March 18, 1998

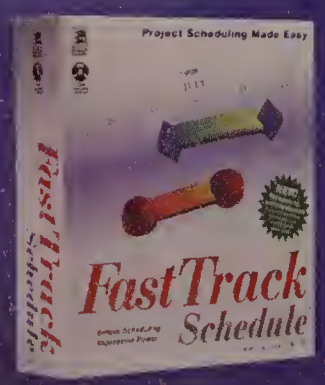
We couldn't have said it better ourselves.

The experts agree. FastTrack Schedule 5.02 is the right choice for easy project scheduling — enabling you to create presentation quality schedules quickly and easily. Here are some of the ***NEW*** features found in version 5.02:

- Real-Time Internet & Intranet Collaboration
- Visual Basic Automation
- Custom Calculation Fields
- Automated Legend Builder
- Column & Time Period Summaries
- Year 2000 Compliancy
- Export to HTML, GIF, TIFF or JPEG
- Pop-up Choice Lists
- And many more!



Why waste time struggling with complicated and costly project management programs? FastTrack Schedule 5.02 is easy-to-use, intuitive, and extremely flexible. It's available for Windows 3.1x, Windows NT 4.0, Windows 95, and Macintosh. And because it's also fully Windows 98 compatible, everyone in your office can stay on schedule today and into the 21st century. So whether you need to plan a day's worth of activities or a year's worth of projects, you'll stay on schedule and achieve project goals with FastTrack Schedule.



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storage compartments. Many of today's brightest ultraportables (projectors under 10 pounds) use Texas Instruments' DLP all-digital technology because it allows for a smaller, more compact optical system than what is used in conventional LCD systems. You might want to check into manufacturers that use DLP if you're looking for a bright, light, and compact system.

Memory—Several projectors now offer ample memory to store short presentations on PC cards. If your presentations tend to be brief, and you don't vary the sequence of delivery, look for a projector with this feature. It can reduce considerably your travel load by eliminating the need to bring your laptop to the presentation.

Peripherals—If sound is not an important part of your presentation (or you generally give informal presentations to very small groups), stick with your projector's built-in speakers. External speakers are just one more thing to lug around and worry about. If sound is critical, however, good speakers are well worth the extra hassle. If your presentation depends on peripherals, think of creative solutions. For instance, if you need video bring a portable camcorder instead of a bulky VCR.

Durability—By and large, LCD projectors are rugged. But just in case, choose a projector that offers a heavy-duty carrying case option. In these days of carry-on luggage limitations, you might have to check your projector—so make sure it's well protected.

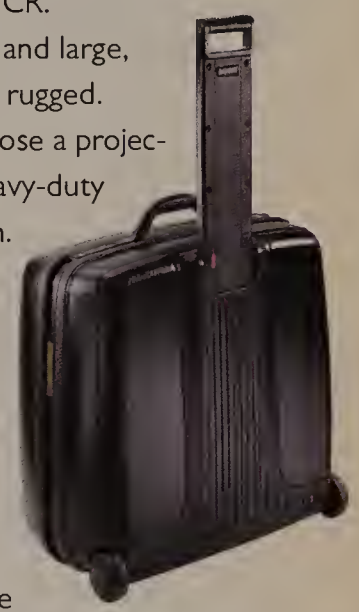

Photo courtesy of Sony Electronics

Service—Before you buy, pay special attention to the kind of coverage that comes with your machine. Some manufacturers offer overnight replacement as a standard feature; with others it's a supplemental charge. If you're often on the road, overnight replacement can make the difference between a successful trip and a waste of time.

BUYERS' GUIDE

(continued)

Sony

Model **VPL-X600U**
Technology **3-panel polysilicon LCD**
Resolution **XGA**
Brightness **600 ANSI lumens**
Weight **12.8 lbs.**
Price **$9,990**

Model **VPL-S800U**
Technology **3-panel polysilicon LCD**
Resolution **SVGA**
Brightness **750 ANSI lumens**
Weight **55 lbs.**
Price **$9,990**

Model **VPL-S600U**
Technology **3-panel polysilicon LCD**
Resolution **SVGA**
Brightness **650 ANSI lumens**
Weight **12.8 lbs.**
Price **$6,490**

Model **VPL-S500U**
Technology **3-panel polysilicon LCD**
Resolution **SVGA**
Brightness **450 ANSI lumens**
Weight **22 lbs.**
Price **$5,990**

Model **VPL-SC50U**
Technology **3-panel polysilicon LCD**
Resolution **SVGA**
Brightness **500 ANSI lumens**
Weight **8.2 lbs.**
Price **$5,990**

Sony VPL-SC50U

Model **VPL-V500Q**
Technology **3-panel polysilicon LCD**
Resolution **VGA**
Brightness **500 ANSI lumens**
Weight **22 lbs.**
Price **$4,990**

ViewSonic

Model **PJ1000**
Technology **3-panel polysilicon LCD**
Resolution **XGA**
Brightness **600 ANSI lumens**
Weight **20.0 lbs.**
Price **$6,995**

Model **PJ820**
Technology **3-panel polysilicon LCD**
Resolution **SVGA**
Brightness **750 ANSI lumens**
Weight **21.6 lbs.**
Price **$5,295**

Model **PJL802**
Technology **3-panel polysilicon LCD**
Resolution **SVGA**
Brightness **400 ANSI lumens**
Weight **11.0 lbs.**
Price **$4,295**

ViewSonic PJL802

For daily online information about making effective presentations, visit PC World's Presentations Tip of the Day Web site at www.tipworld.com

Tip World

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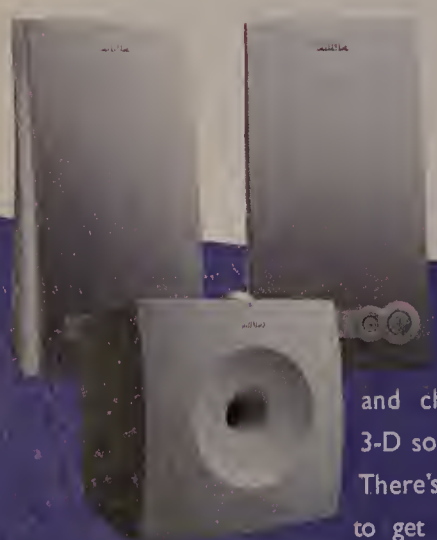
My PC's having an identity crisis.
It thinks it's my stereo system.



My PC used to just run. Now it does the tango, salsa and cha-cha-cha. I conquer game-villains with arcade-like, 3-D sound and play CDs that have me swaying like a symphony. There's always been music in my computer. I just realized how to get it out. **USB Digital Speakers.** No sound card. No manuals. No rebooting. Just pure, digital sound without the installation hassle. For more information, **call 1-800-835-3506 or visit us at www.usbaudio.philips.com**

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PC WORLD @HOME

Cheap and Colorful: Ink Jets Under $150

Can a paper junkie discover true happiness with a cheap printer? ◆ BY KAREN SILVER

CLOCKWISE FROM LEFT: NEC SuperScript 150C, HP DeskJet 400L, Canon BJC-250, Lexmark 1100 Color Jetprinter, Compaq IJ200.

HELLO, MY NAME IS KAREN, and I'm a paper addict. (Hi, Karen.) In the wired world, that admission is tantamount to saying I listen to eight-tracks and drink diet Tab. At home, I get eight magazines, seven mail-order catalogs, and one newspaper. I buy books by the half-dozen. When I surf the Web, I print out pages to read on the train. In an age when you can get directions on the Net, an encyclopedia on CD-ROM, and news via e-mail, what's a paper junkie to do? Buy a new printer.

Tragically, with all these subscriptions and book-buying binges, I don't have much leftover money—or room. In search of the perfect fix, I checked out five compact color printers selling for less than $150. (A new Epson, the $149 Stylus Color 440, was too late for review; it should be in stores by the time you read this.)

For that price, I didn't expect quick performance or stellar print quality, so I was surprised to find that a couple of these models turn out good-looking images relatively fast. In my decidedly unscientific tests, nearly all of them printed a page of text in about half a minute—except the NEC SuperScript 150C, which took almost a minute and a half. An Adobe Photoshop color image printed in around 2 minutes on all but the Canon BJC-250 and the Hewlett-Packard DeskJet 400L, which took half that long.

The five printers share several characteristics. All are single-cartridge ink jets, which means you can only use one cartridge at a time—either an all-black one or one that prints three colors. If your printer comes with only a color cartridge (like four of the printers here), you'll spend $30 to $40 for a black cartridge—a necessity to print true black. (Three-color cartridges produce a greenish composite black.) The HP, meanwhile, comes with only its black cartridge; a color cartridge costs an additional $35.

All the printers are the same tiny size—around 14 by 7 by 7 inches—weigh about 5 pounds, and are shaped like a Tootsie Roll with two flat sides. Only the Lexmark 1100 Color Jetprinter has a paper output tray; with the rest, the prints just ooze out onto your desktop. Finally, each printer comes with a one-year warranty. From there on, these printers distinguish themselves in print quality, features, and documentation—in short, the things that make owning a printer worthwhile.

CANON FIRE

I STARTED MY paper chase with the $129 **Canon BJC-250**, which nearly spoiled me for the others. It was simple to set up, thanks especially to its quick-start ▶

PHOTOGRAPH: MARC SIMON

guide and well-illustrated manual. The sophisticated software covers every type of image from photos to text—and even has an "automatic" setting that lets the software decide everything for you. The bundled software helps you print banners, T-shirt transfers, greeting cards, and even picture frames. I could cover my walls with paper! (Insert maniacal laughter here.)

Even without the optional photo ink kit ($47 list), the BJC-250 impressed me with its print quality—the best overall of the group. Photos came out realistic and fairly sharp on plain paper, and very crisp on glossy paper, though the resolution is just 360 by 360 dots per inch. I used the optional $32 black cartridge to print clear text. None of the printers did especially well with my photo in black and white, but the Canon was the best of the bunch. In my informal tests, the BJC-250 was also one of the fastest, but don't look for lightning speed from any $150 printer. You'll get better print quality and faster performance from a more expensive dual-cartridge printer, but to my mind, the Canon BJC-250 is a terrific value. Cheap, small, simple, and capable—what more could you ask for?

PRINT QUALITY SAMPLES

Pretty Pictures at a Nice Price

FLYING COLORS: **Canon's BJC-250 prints the best photos of these single-cartridge ink jets, with fairly crisp details and good color.**

SAVE THE PAPER: **Washed-out color and fuzzy details are the hallmarks of the DeskJet 400L from Hewlett-Packard.**

CHEAP CUT FROM COMPAQ

WELL, MAYBE YOU *could* ask for more, but you wouldn't get it from the new **Compaq IJ200.** It costs as much as the Canon ($129) and is a good general-purpose printer, but its output quality and features aren't quite as satisfying. The IJ200's manual, disappointingly, comes only on CD-ROM. Fortunately, the manual's helpful quick-start guide got me set up fast. The printer is easy to put together and use, though I wasn't happy with its flimsy front cover.

Compaq put some high-quality technology (based on Lexmark's printers) into the IJ200. Just a smidge below the Canon BJC-250 on print quality, the Compaq produces handsome photographs and text, even on plain paper. On glossy paper, a 600-by-600-dpi photo of my brother, my sister, and me at our last family reunion was worthy of sending to my mother. But I still preferred the Canon BJC-250's lower-resolution photo quality on glossy paper—its color was sharper and more realistic. The IJ200 prints cards, banners, and transparencies, but no fancy stuff, and its speed is about average. I liked the Compaq, but for better print quality and features, I'd recommend the Canon.

HP: HARDLY PERFECT

I WANTED TO like the **HP DeskJet 400L,** since Hewlett-Packard often produces admirable printers, but it wasn't easy. With its weak print quality and completely useless documentation, the DeskJet 400L isn't worth the paper it prints on. It lacks a quick-start guide, and the index-free manual is a measly 16 pages long. Like the other four printers, the HP comes with only one cartridge. But unlike the others, it's the *black* cartridge. Why? So HP can sell the printer for just $129. I paid an extra $35 (list) for the ability to print—badly—in color.

The 400L is fast, but its print quality was the lowest of the bunch in nearly every category. I printed out a color photograph to hang in my cubicle at work, but the 300-by-300-dpi image looked flat and fuzzy, and improved very little with special settings (of which there are few) or glossy paper. In black and white, the HP's photo printing was the worst of the group, though my letter to the IRS came out pretty good (too bad). The 400L prints greeting cards and transparencies, but it won't do T-shirt transfers or banners. If my heart belonged to HP, I'd skip this model and wait for its as-yet-unnamed replacement, which should hit stores around early winter.

F Y I

HALF OF THE ten most widely played computer games are good old-fashioned card games such as solitaire. Newer titles like Myst, Quake, and Tomb Raider don't even make the list.

SOURCE: MEDIA METRIX

LEXMARK'S THE SPOT

LEXMARK'S **1100 Color Jetprinter** is the cubic zirconia of printers: a cheap little jewel. The $119 Lexmark is a snap to assemble, literally: All I had to do was pop the paper input guide into the back of the printer, the paper output guide into the front, and the ink cartridge ▶

SCORECARD

Canon BJC-250
Grade: **A-**; $129 street; Canon; 800/652-2666; www.ccsi.canon.com
INFONET NO. 608

Compaq IJ200
Grade: **B**; $129 street; Compaq; 800/345-1518; www.compaq.com
INFONET NO. 609

HP DeskJet 400L
Grade: **D**; $129 street; Hewlett-Packard; 800/752-0900; www.hp.com
INFONET NO. 610

Lexmark 1100 Color Jetprinter
Grade: **B+**; $119 street; Lexmark; 800/539-6275; www.lexmark.com
INFONET NO. 611

NEC SuperScript 150C
Grade: **C**; $119 street; NEC; 800/632-4636; www.nec.com
INFONET NO. 612

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Compaq Presario 4860

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- 8.0 GB[2] Hard Drive
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- 56K Modem[4]
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- 3.2 GB[2] Hard Drive
- 16X[5] CD-ROM Drive
- 33.6K Modem
- Accelerated 64-bit graphics with Direct 3D™
- Microsoft® Windows® 95
- Special price, monitor sold separately

$549 refurbished

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- 64 MB ECC SDRAM
- 24X Max[7] CD-ROM Drive
- 4.3 GB[2] UltraSCSI Hard Drive
- Compaq Netelligent Network Controller
- 512KB Cache
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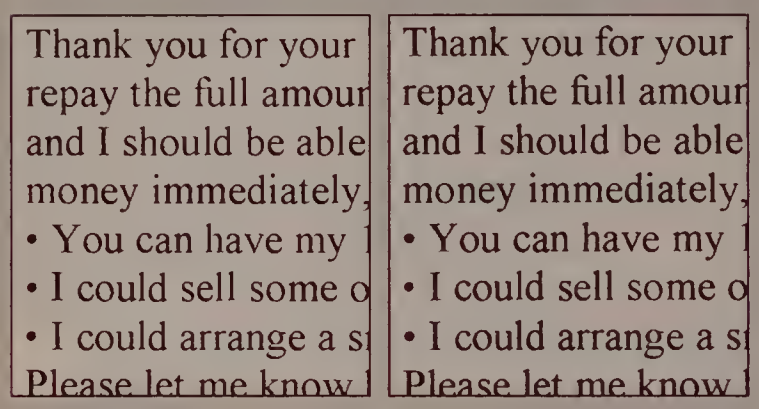
inside. The quick-start guide got me set up painlessly, and the manual was adequate, though it could use a better index. I have just two small beefs: First, I wish the front cover opened a bit wider so I could put the ink cartridge in more easily. Second, I accidentally mistook the slot at the back of the printer for the place to insert the cartridge.

PRINT QUALITY SAMPLES

Letter-Perfect Text for Less



NOW READ THIS: **Even the IRS gets the royal treatment from Compaq's IJ200—crisp, dark text without a lot of ink spray.**

GET THE MAGNIFIER: **Documents printed on the NEC SuperScript 150C don't leave a good impression—note the fuzzy text.**

Apparently, I'm not the only one who got confused: Lexmark added a note that reads, "Store EXTRA CARTRIDGE here." I think Lexmark should replace the slot with a separate holder, like the kind most single-cartridge printers have.

Though it was the second-slowest printer in my informal tests, the 1100 produced good-looking prints. They looked especially nice at 600 by 600 dpi. Its color was attractive, if a little fuzzier than the Canon's and Compaq's, while its grays were dark but fairly detailed. Text came out crisp and rich. Like the Canon BJC-250, the Lexmark prints banners, T-shirt transfers, greeting cards, photos, and even documents with waterproof black ink.

NEC'S NOT-SO SUPERSCRIPT

THE SUBJECT OF my final taste test, the **NEC SuperScript 150C**, didn't go down easy. It's dirt cheap—$119, brought down to an unbeatable $79 with a $40 rebate—but awkward to set up. I had to rely on the sparsely illustrated manual because there wasn't a quick-start guide. Then I had trouble inserting the ink cartridge. Finally, even though you'll find its software driver on both CD-ROM and floppy disk, I still had to install it via Add Hardware in my Start menu.

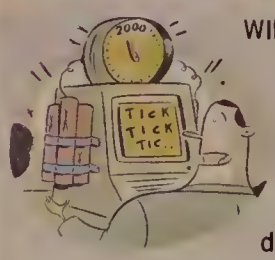
Once I got it going, the 150C didn't improve much. It was the slowest printer here, and its 600-by-300-dpi print quality didn't thrill me. The NEC printed such a fuzzy photograph—only slightly better than the HP DeskJet 400L's—that I wouldn't even put it up at work, and that's saying a lot. On glossy paper, the photo's color looked garish; in black and white, the image was ho-hum. If I didn't care about print quality, I could have created all kinds of amusing things like cards and T-shirts on the 150C, since it comes with fun software. But for the same price (before rebate), I could get a lot more value from the Lexmark.

PAPER VIEW

MUCH AS I'D like to keep all five models set up and spewing pages, alas, I had to choose. The race was close, but when I spread the printouts across my table (ahhhh), the Canon BJC-250 pleased me best. Then again, with my voracious habit, maybe I should spend another C-note and get the Lexmark 1100 Color Jetprinter, too. My next purchase: a really big filing cabinet.

Karen Silver is a senior associate editor for PC World. ■

F Y I



WILL A computer crisis occur when we hit the year 2000? In a recent poll, 48 percent of respondents predict gloom and doom; 47 percent aren't worried.

SOURCE: THE POLLING REPORT, INC.

KEEPING UP

Design Your Own Home PC

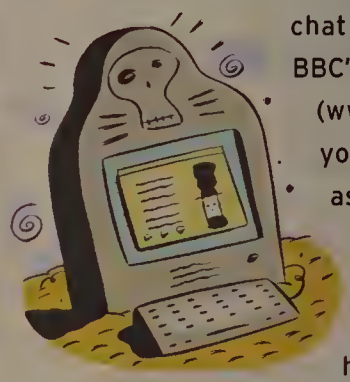
BUYING A PC at a retail store usually means settling for something that's in stock—even if you really wanted more RAM or a smaller hard disk. Circuit City plans to change that: The 510-store chain is installing touch-screen kiosks that will let you custom-configure a PC from Compaq, Hewlett-Packard, IBM, or NEC. Once you settle on a system, it will be shipped to your doorstep in seven to ten days, according to Circuit City.

Pounding the E-Pavement

PERUSING JOB postings online may be easier than pawing through newspaper listings, but it's no picnic—the Web's want ads lie scattered over dozens of sites. To simplify the search, try WantedJobs98. This free software lets you specify your state, a job category, and various keywords. Then it grabs ads from multiple sites and combines them into one easy-to-browse list. WantedJobs98 now searches 18 major job sites, but its developers plan to expand the total to 40. Download it from www.wantedjobs.com.

Lifestyles of the Deceased and Fictional

WHAT WOULD Abraham Lincoln have thought of the United States in the age of Clinton? If you had participated in his recent chat session at the BBC's Beeb Web site (www.beeb.com), you could have asked him yourself. The site's weekly Fantasy Chats host historical and imaginary figures, portrayed by experts on the famous folks. Past guests have included Marilyn Monroe, Sherlock Holmes, and Henry VIII. For schedules and transcripts, visit www.oi.beeb.com/chat/fantasy.



Kid-Safe Web Searching

YOUR KIDS ARE itching to explore the Web, but you want to protect them from its red-light districts. Steer them toward Disney's Internet Guide (www.dig.com), a new Web guide with kid-oriented channels and a smut-free search engine. —Harry McCracken

ILLUSTRATIONS: HARRY CAMPBELL

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Unclog Your Net Access, Part Deux

WHEN THE INTERNET dies, blame me, Steve "Bozo" Bass. At least, that's the word from members of the North American Network Operators Group. The responses came after I suggested in June's *@Home Office* that readers tweak a Registry setting to speed up Internet access. NANOG members worried that, if readers took my advice, the Net would melt.

So they flamed me. They called me a bozo, accused me of being antisocial, and asked (rhetorically, I think) if I was an imbecile or a moron. (I like the bozo characterization—it matches my hairline.)

Well, fuel up your flamethrowers, folks, because I'm about to do it again. I've uncovered more ways to unclog your Internet access. And I don't care who knows about it.

AS THE INTERNET MELTS

FIRST, A QUICK history lesson: In June's *@Home Office,* I explained how to lower a value in your Registry settings—the MaxMTU—so data packets arrive from the Internet faster. (Read the column at www.pcworld.com.) That's when the bits hit the fan. According to NANOG, if *everyone* online changed the setting tomorrow, the Internet would collapse (and maybe cause an earthquake in Pasadena). And I suppose it might. But then again, I also heard dire warnings last year that Web caching software might wreak havoc on the Net, and it hasn't.

Some Internet service providers I talked with are extremely concerned about computer users tweaking their MTU settings. However, just as many ISPs aren't at all anxious, with some even recommending the setting change themselves. Over 600 readers have written me (a record) about the subject, many raving about miraculous changes in their Web browsing. For example, Patrick Gallant of Calgary, Alberta, writes, "I tried your suggestion...HOLY COW, THIS BABY SMOKES NOW!!!" To be fair, some readers saw little or no increase. More on that in a sec.

> I tried your **suggestion. HOLY COW, THIS BABY SMOKES NOW!!!**

Me? My Supra 56K modem slurps in those smaller data packets twice as fast at the lowered settings. I guess I'll risk a meltdown. But decide for yourself: Visit the NANOG site at www.merit.edu/mail.archives/html/nanog/threads.html, and look for messages cordially entitled "PC Bozo's World bites again."

For another perspective, check out Al's WinSock Tuning FAQ at www.cerberus-sys.com/~belleisl. Then make up your own mind. But be forewarned: These sites raise geekspeak to a new level.

I WANT MY MTU

SOME READERS have told me that they changed their PC's MaxMTU setting but saw only a small speed increase; others had to fiddle with the settings more than they would have liked.

For these people, TouchStone's clever $40 NetOptimizer program does the tweaking for you: It calls its own server, tries dozens of Registry setting combinations, and fine-tunes your Internet connection. It saves the old settings and then, with your permission, makes the necessary changes. Novices can comfortably use the program, and advanced users can play with the settings in manual mode.

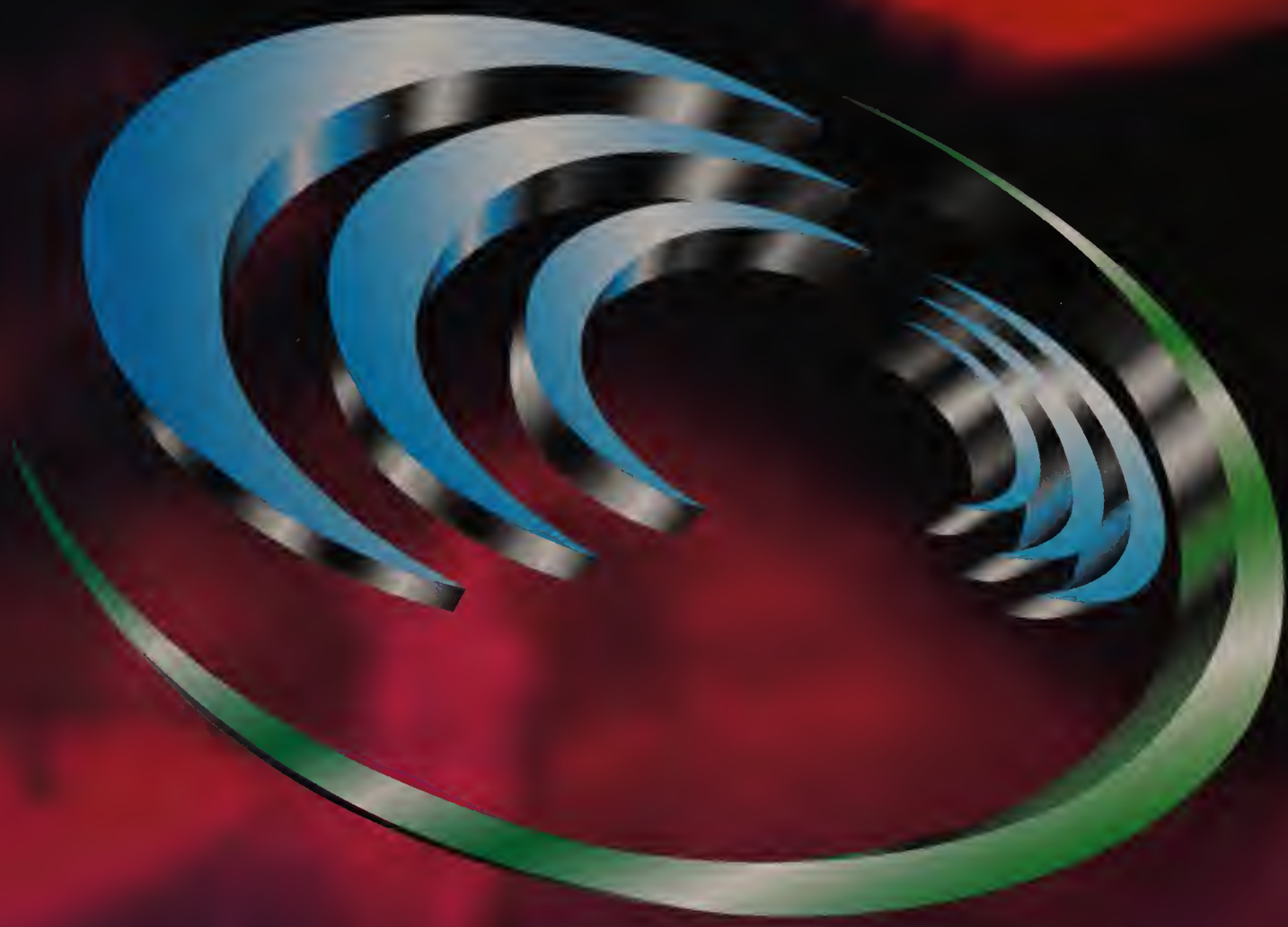
I also like NetOptimizer's smart dialer. It makes sure I'm connected at the highest speed possible and continually monitors my online activity. The program also examines my modem and lets me back up my Dial Up Networking settings, a vital feature foolishly missing in Windows. TouchStone sells the NetOptimizer with a 30-day money-back guarantee, and the app works with Windows 9*x*.

If you're an America Online user, you too can make use of the MTU tweak. But you'll have to jump through some hoops, since AOL's software resets the MTU value every time you log on. But fear not: I tried a work-around from AOL guru George Gombos, and it did the trick. Check out George's terrific tips page at members.aol.com/axcel216 and follow the directions under the "AOL MaxMTU Tweaks" section.

And the Internet meltdown? I'm not worried. An earthquake's bound to send California into the ocean first.

NetOptimizer
$40 street; TouchStone; 800/932-5566; www.touchstonesoftware.com
INFONET NO. 613

Contributing Editor Steve Bass is a licensed marriage and family therapist and the president of the Pasadena IBM Users Group in Pasadena, California. He can be reached on PC World Online (see page 14 for contact information). ■



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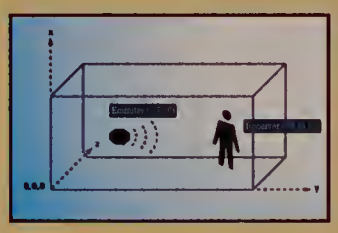

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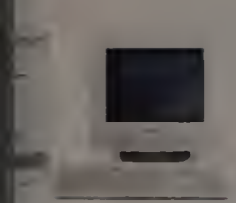

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HERE'S HOW

WINDOWS TIPS

SCOTT DUNN

Get Organized With Windows 98 Toolbars

IN CASE YOU haven't noticed, Windows 98 and Internet Explorer 4 add tons of new toolbars to the screen. Just right-click an empty area of the taskbar or one of its toolbars, select *Toolbars,* and choose one or more of the following options:

Address gives you a handy command line for accessing Web sites, opening folders, and launching applications. *Links* is a good place to drag and drop favorite Web addresses and other objects. *Quick Launch* can hold the Show Desktop button and Shortcuts to any app or file. *Desktop* provides a quick way to access desktop objects when the desktop itself is obscured by open windows. *New Toolbar* creates a toolbar to show the contents of any folder.

Though these toolbars represent potential time savers (or at least click savers), how do you cope with the visual noise they add? Here are some ideas, many of which are illustrated in **FIGURE 1**.

Turn off what you don't need: For example, the Links and the Quick Launch toolbars do basically the same thing—they hold program or folder Shortcuts and Web links. Drag the best items from one onto the other; then nix the empty one. (You remove a toolbar by right-clicking the taskbar, choosing *Toolbars,* and unchecking the toolbar's name.)

And what about that Desktop toolbar? If it's cramping your taskbar, check out alternatives for getting to the desktop (see "Better Ways to Your Desktop," *Windows Tips,* June, page 285).

Go vertical: If you need two or three toolbars on screen, save space by dragging one or more of them to another edge of your screen. For example, you might keep the taskbar and the Quick Launch bar in a single vertical column on the left or right margin. But keep the Address toolbar, which needs a lot of horizontal space, at either the top or bottom of your screen.

Float them: If screen real estate isn't an issue, you can simplify the taskbar by turning toolbars into floating palettes. Just position the pointer near the toolbar's title (or where the title would be, if you've hidden it) and drag and drop to the desktop.

Keep oft-used toolbars on top: If you frequently use objects on a floating palette, you can keep the palette accessible by right-clicking it and choosing *Always on Top.* Though toolbars lack Minimize buttons, clicking the Show Desktop button on the Taskbar will hide floating palettes (except those set to be Always on Top). The palettes will reappear the next time you restore a window or click Show Desktop.

Create a folder toolbar: If you regularly access a folder of files, you can transform the entire folder into a toolbar with icons representing each file within. Simply drag the folder (or a Shortcut to it) to any edge of your screen to create an instant toolbar displaying the folder's contents.

Shrink icons and remove labels: Right-click any toolbar and choose *View•Small* to shrink the icons, or uncheck *Show Title* to eliminate the toolbar's title. Finally, you can save a lot of space by hiding the name of each toolbar icon: Right-click the tool-

ILLUSTRATION: JOHN BLECK

bar and then choose *Show Text* to uncheck this option. You can always hover the pointer over an icon until its explanatory "tool tip" appears.

Hide what you don't need: If you have additional toolbars on different edges of your screen, you can minimize clutter and gain space by right-clicking a toolbar and choosing *Auto Hide*. The toolbar will disappear when not in use but pop back into view when you move your pointer to its edge of the screen.

Combine two or more into one: If you want multiple toolbars without cluttering the desktop, drag one toolbar onto an existing palette. Presto! The two toolbars become a single connected palette, while maintaining the attributes (icon size, visible titles or text, and so on) ascribed to each. Drag the separator to adjust the space each gets, or drag any edge to resize the entire palette. You can't drag two floating toolbars together to form a single floating palette, but you can drag a toolbar from the taskbar and drop it onto a floating palette to create a connected floating palette.

Rearrange buttons to suit your needs: Don't rely on anyone else to put your toolbar buttons in the order that's fastest or most logical to you. You can rearrange the buttons on any toolbar or palette just by dragging. In fact, you can do the same for anything on the Start menu.

COPE WITH AN OVERCROWDED SCREEN

WINDOWS SCREENS get cluttered fast, especially if you're working on an older machine or laptop system that forces you to work in 640 by 480 resolution. Here are some coping strategies.

Switch between maximized applications: The easiest way to minimize screen clutter is to maximize all open applications, switching between them by pressing **<Alt>-<Tab>**. If you're running a lot of applications, it may be quicker to press **<Ctrl>-<Esc>** to open the Task List, and then double-click the application you want to switch to.

Turn off unneeded toolbars: You can see more of your work if you turn off unnecessary toolbars or status bars (check your documentation for details). Some applications let you hide or reveal all floating palettes with one keystroke—for example, the <Tab> key in Adobe Photoshop.

Reveal hidden applications: If you keep your current application maximized, you can get easy access to other applications by pressing **<Alt>-<Esc>**. This tactic reveals icons for all open apps; it works best if you keep the applications minimized. If all your apps are maximized, pressing **<Alt>-<Esc>** shows you the last-used window.

See everything: To maximize the window you're currently working in while retaining quick access to minimized applications, minimize all applications except the one you want to work in. Press **<Ctrl>-<Esc>** to open the Task List, and click *Tile* (or press **<Alt>-T**). Your window will fill the entire screen except for a small space at the bottom where Windows displays the icons of currently running applications. If you resize all windows this way and minimize the current application before restoring another, you can maintain this view for all applications throughout your session.

Remove the labels: You can make Windows automatically push an application's label ▶

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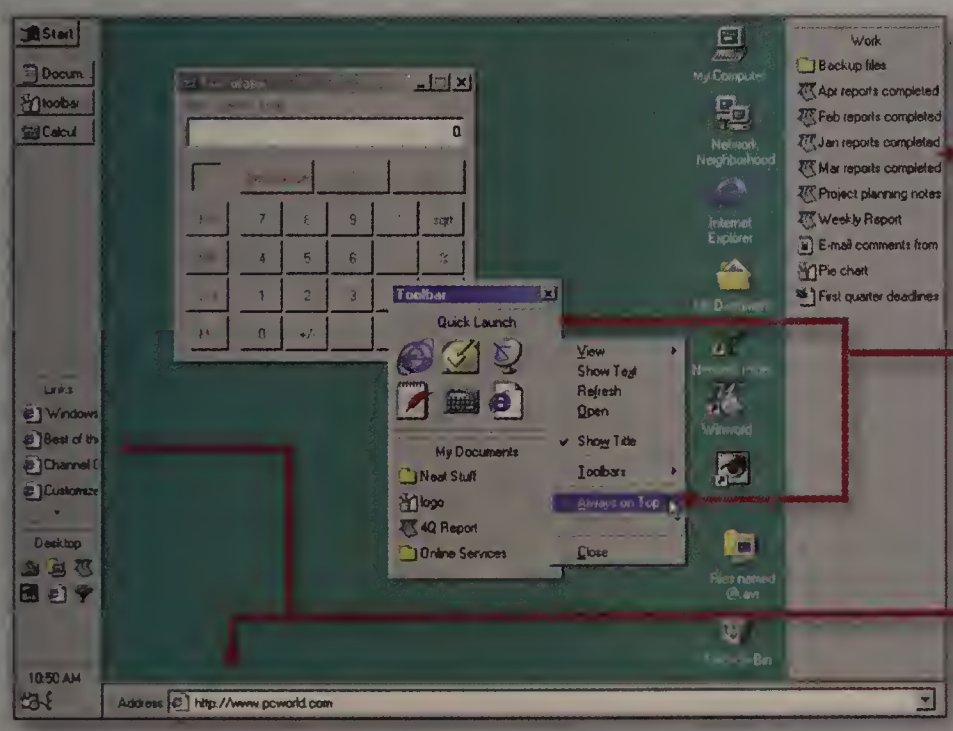
Retool Windows 98's Toolbars to Get Them Exactly to Your Liking



Drag any folder to the edge of the screen to create a toolbar showing its contents.

Float frequently used toolbars. You can keep them from getting buried under open windows by right-clicking them and selecting *Always on Top*.

More icons will fit onto a vertical toolbar, but keep the Address bar horizontal.

FIGURE 1: KEEP A FAVORITE TOOLBAR on top at all times, make a horizontal toolbar vertical, or combine two into one—whatever works for you.

below the bottom of the screen by performing a simple win.ini edit. But this maneuver can affect your icon arrangement in Program Manager, so first set up the icons in each Program Manager window the way you want them. Then select *Options* and make sure Auto Arrange is not checked. In the future, avoid using both this option and Window•Arrange Icons. Now press **<Shift>** as you choose *File•Exit Windows* to save your current Program Manager arrangement.

With Program Manager taken care of, you can fix icons on the desktop: In Program Manager or File Manager, choose *File•Run*, type **win.ini**, and press **<Enter>**. Under the [Desktop] heading, look for a line that begins 'IconVerticalSpacing='. (If it's not there, add it.) Edit the value that follows the equal sign to something smaller. For example, values of 30 or lower will hide the entire icon label (see **FIGURE 2**), while values of around 50 will show one line of the label. Save the file and restart Windows to see the result.

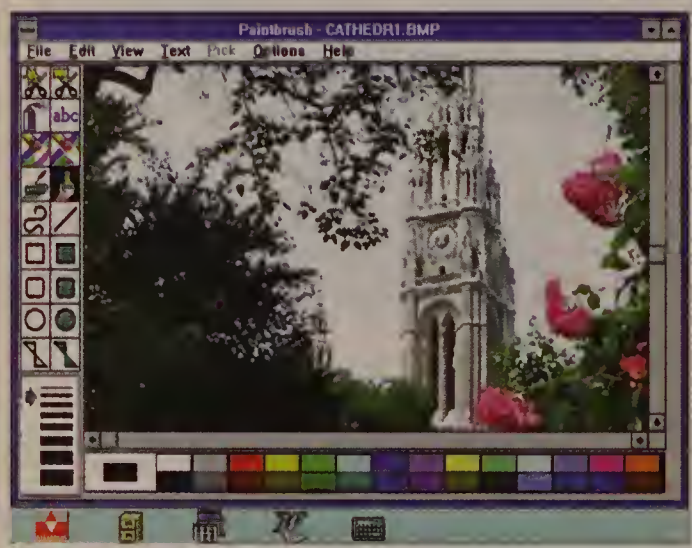


FIGURE 2: HIDE THE LABELS of minimized Windows 3.x applications to give your current work more screen space.

TILE FILE MANAGER YOUR WAY

WINDOWS FOR Workgroups 3.11 File Manager makes it easy to tile its directory and file windows vertically or horizontally: Choose *Window•Tile Vertically* or *Window•Tile Horizontally*. Windows 3.1, however, gives you only one option—*Windows•Tile*—which tiles windows horizontally. Fortunately, you can still tile windows vertically by holding **<Shift>** as you choose *Windows• Tile*. Or press **<Shift>-<F4>** to tile windows vertically in either version of Windows. To tile windows horizontally in Windows for Workgroups 3.11, press **<Alt>-W**, then press **H**. In Windows 3.1, press **<Alt>-W**, then **T**.

CHANGE YOUR FIND

HOW DO I customize the Find Files or Folders command so that it will automatically search all of my hard drives and not just drive C:?

Wayne Lee, Edmonton, Alberta

WINDOWS' FIND COMMAND isn't the most cooperative of utilities. But with a little work-around, you can get it to start with the search parameters you desire. The trick lies in the Save Search function.

In Windows 95, choose *Start•Find•Files or Folders*. In the Named box, type the file specifications you prefer, separating multiple entries with a comma, a space, or both. For example, if you usually search for text files, you might type ***.txt *.doc**. (Wild-card characters like * and ? are optional.) In the 'Look in' box, type the paths you use most often, separated by a semicolon (plus an optional space)—**c:\doc; d:\temp; e:**, for example. Use the *Date Modified* and *Advanced* tabs to limit the search by date, file type, size, or text content.

When everything is set, click *Find Now*. If the resulting list of found items is one you expect to work with regularly, choose *Options* and make sure a check mark appears next to 'Save Results'; if it's not there, select *Save Results* (see **FIGURE 3**). Now choose *File•Save Search*. Unfortunately, Windows doesn't let you choose where to save the file or what to call it; it simply appears on the desktop with a name of its own choosing—such as 'Files named @.txt.fnd'. But you can rename the file and move it to a convenient location, such as a folder within the Start Menu folder. If you frequently perform a series of different searches, save each of them for fast access.

Windows NT 4.0, Windows 98, and Internet Explorer 4 marginally improve customized finds. For starters, you can choose *Local hard drives* from the 'Look in' drop-down box rather than typing in each path. And Win 98 and IE 4 save the last location you entered in the 'Look in' box so you don't have to choose File•Save Search. Unfortunately, no version of Windows preserves the Find window's position or size.

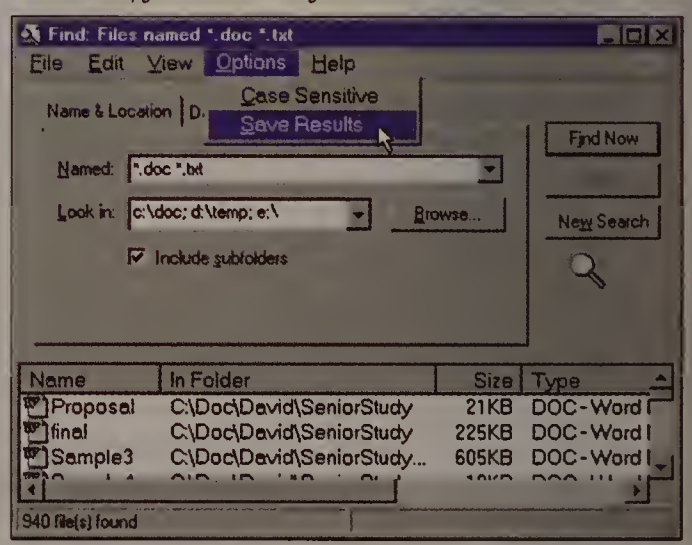
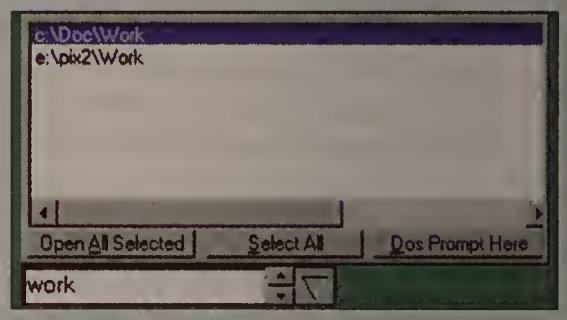


FIGURE 3: SPEED UP FILE SEARCHING by saving Find settings and even the results of searches.

WINDOWS TOOLBOX

Find Folders Fast With DirNow

DO YOU SPEND too much time digging through folder windows or climbing up and down directory trees? Check out DirNow. This freeware program by Paul Smith appears as a small box in which you type a few characters of the folder you seek. Press **<Enter>**, and up pops a list of folders matching your entry. Select one, press **<Enter>** again, and the folder opens in Explorer or another file utility. DirNow is fast and consumes little memory. It's available from FileWorld on PC World Online (www.fileworld.com).



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YOUR QUESTIONS ON: Creating custom menus ◆ Backing up address books

Taking Virus Protection to an Illogical Extreme

CAN I REMOVE a memory-resident virus—or any virus—by running DOS's Fdisk and Format commands to wipe out everything on my hard drive?

Victor Heimur, Rutherford, New Jersey

DON'T DO IT! Reformatting your hard drive takes a huge amount of work and likely won't kill the virus. After all, your boot floppy may also be infected—or your Fdisk or Format programs. Or you could reinfect your system while reinstalling your applications. And some viruses, like Monkey, can survive an Fdisk reformat and make things even worse.

If your antivirus program (you *do* have one, right?) can't fix the problem, contact the vendor. There may be a solution in the works, and if not, the experts in the lab will want to see what you've got. You can also try another program (see "Virus Killers 1998," March).

ARE SWITCH BOXES SAFE?

I'M INTERESTED in connecting my PC to two, perhaps three printers—a Hewlett-Packard 855C, an HP 4L and, I hope, an old Epson dot matrix. The first two need bidirectional connections. I thought of using a manual switch box, but I've heard that these can send damaging voltage spikes to a printer. What should I do?

Andrew G. Detrick, Bellefontaine, Ohio

SWITCH BOXES FALL into two categories, mechanical and electronic, depending on how they do the switching. You should never use a mechanical switch with laser or ink jet printers; as you said, they can send nasty spikes through their cables. But electronic switch boxes are basically safe. A reasonably large number of companies manufacture both kinds.

Many people think electronic switch boxes are automatic—that the boxes know when to switch devices. This is true if you're sharing one printer with multiple computers, but not in a situation like yours, where you're using multiple printers with one computer. So be sure you get an electronic switch box that also has a switch.

Bidirectional connections are another issue. For this, you'll want a box that supports the IEEE-1284 standard. (Your printer will work even if the connection doesn't support IEEE-1284, but communication from the printer to the computer will be limited.) IEEE-1284-capable boxes are still rare, but by the time you read this, at least two companies, Cables to Go (www.cablestogo.com) and Belkin (www.belkin.com), expect to release multiple IEEE-1284-capable boxes that can handle up to four devices.

Depending on how many printers you want to hook up (your options are generally two or four), whether you need IEEE-1284 support, and assorted bells and whistles, the cost of an electronic switch box and the required cabling varies from about $50 to $110.

You can also use these switch boxes to handle parallel devices other than printers, such as scanners and external drives. While these devices often contain pass-through ports that allow you to connect more than one device to a port without a switch box, these pass-through ports are not without their own problems.

NEW FORMATS IN THE NEW MENU

WINDOWS' NEW MENU, which I get when I right-click a blank spot on the desktop or in Explorer, allows me to create new, empty files in a number of different formats. But the formats it offers aren't the ones I want. How do I add and remove file formats from this list?

Teresa Wiseman, Hudson, Illinois

THE EASIEST WAY to edit the New menu is with Microsoft's Tweak UI PowerToy. If you're a Windows 95 user, you can download this useful free utility from Microsoft (www.microsoft.com) or from PC World Online (www.fileworld.com).

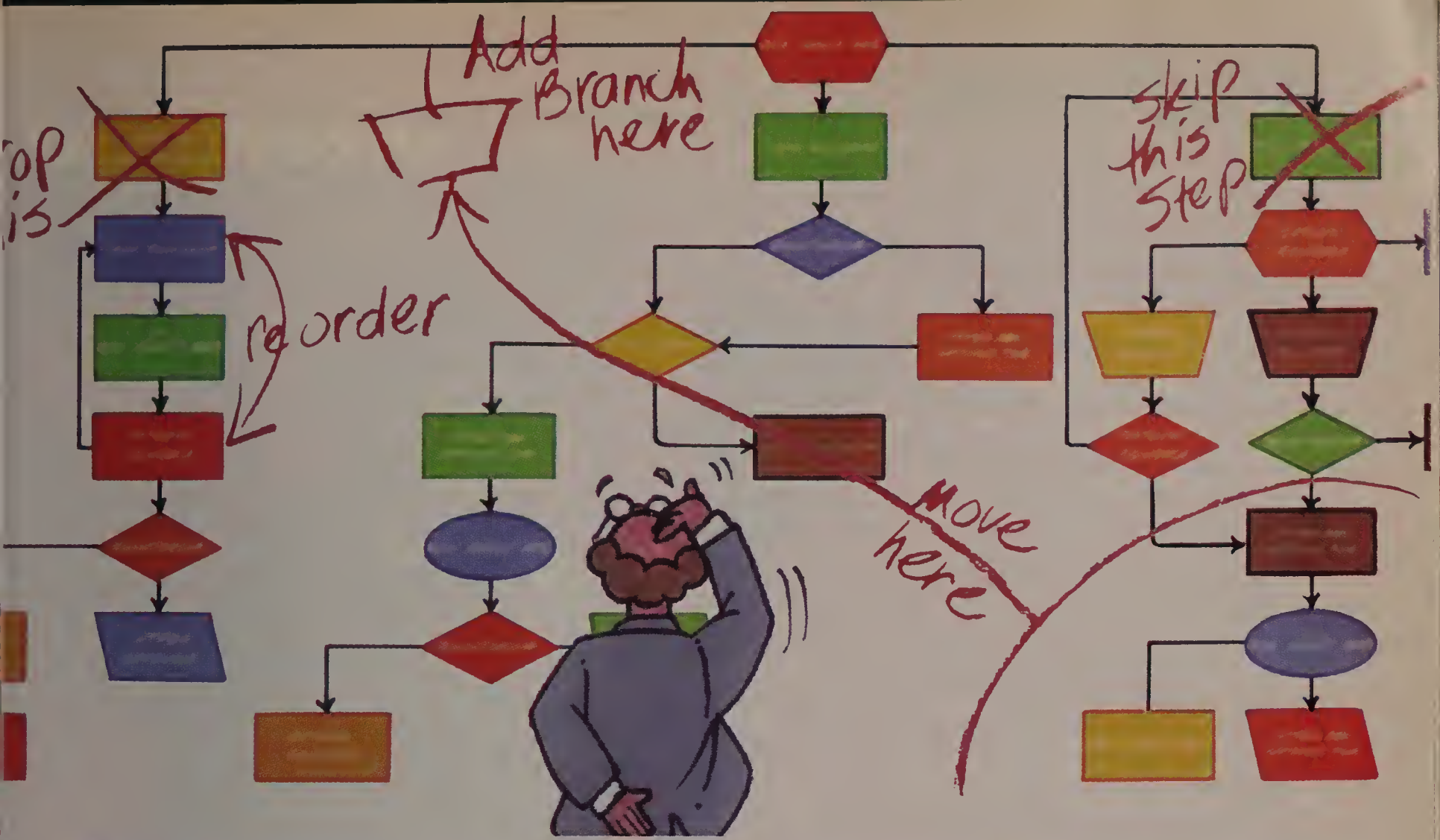
If you're using Windows 98, you already have Tweak UI. You'll find it in the Windows 98 CD-ROM's \tools\reskit\powertoy folder.

Once you've installed Tweak UI, select *Start•Settings•Control Panel*, double-click the *TweakUI* icon, and click the *New* tab (in the Windows 98 version, you'll have to scroll to the tab). Here you'll find a list of all the file formats Windows thinks ▶

Quick Access to the Desktop

EVERYONE COMPLAINS about how hard it is to get to the Windows 95 desktop—especially when you have 234 windows open. Dwayne Neri of Littleton, Colorado, came up with a solution that's faster than right-clicking the taskbar and selecting Minimize All Windows: Select *Start•Run*, type a period, and press <Enter>. Your desktop will appear in a separate window. If the current window is a file folder or Windows Explorer, click on another window first. This won't bring up My Computer or the Recycling Bin.

ILLUSTRATION: JEFFREY PELO (TOP); JOHN BLECK (BOTTOM)



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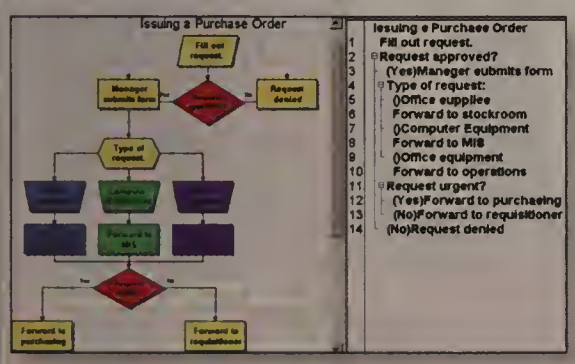

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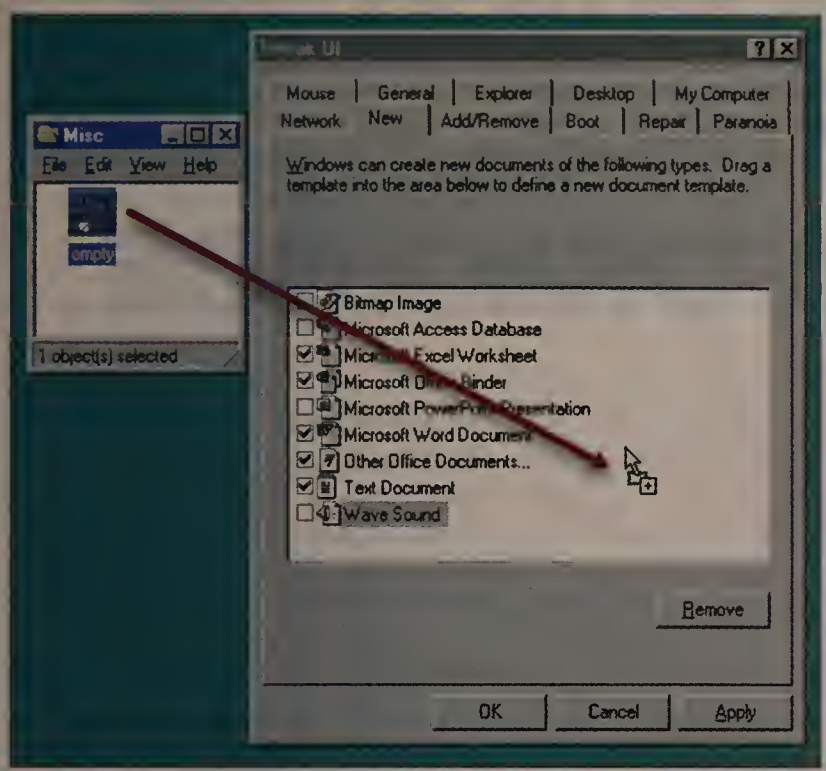
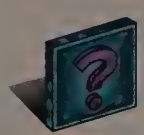


FIGURE 1: YOU CAN ADD a file type to Windows' New menu by dragging an empty file into Tweak UI.

belong on the New menu. To remove a format, simply uncheck it.

To add a file type to the menu, you first have to create an empty file of the desired type. Use the application associated with the file type to do this, and save the file to an out-of-the-way folder. With that folder open, drag the file to the list of file types on Tweak UI's New tab (see **FIGURE 1**).

BACKING UP ADDRESSES



I SOMETIMES HAVE TO reformat my hard drive to get Windows working properly. But when I do this, I lose all the names and fax numbers I've entered into Microsoft Exchange, plus all the e-mail addresses I've stored in Internet Explorer's e-mail program. Can you please tell me what files to back up?

Kent A. Ravaioli,
North Plainfield, New Jersey

MICROSOFT HAS a habit of hiding data (see "A Portable Outlook," page 283). Depending on the version of these programs you're using, the versions you've used in the past, whether you share your computer, and, quite possibly, how often you brush your teeth, your address book files can end up in all sorts of locations and with all sorts of names. One constant: They don't end up in C:\My Documents, where they logically belong.

Another constant, thankfully, is the extension. Both Microsoft Exchange and Windows Messaging address books, which can contain e-mail addresses and fax numbers, are always .pab files. In Internet Mail and Outlook Express, however, they are .wab files. (Microsoft Exchange and Windows Messaging are different versions of the e-mail/fax program that comes with Windows 95; Internet Mail and Outlook Express are different versions of the e-mail program that comes with Internet Explorer and Windows 98.)

Before you format your drive, find your .pab or .wab file: Select *Start•Find•Files or Folders*, in the Named field, enter either ***.pab** or ***.wab**, depending on the program you're using, and hit **<Enter>**. If the search yields only one file, that's the one to back up. If there are multiple files, the right one is likely the one with your name (kent.wab, for example), or the latest one. To be sure, enter the mail program, add a name to the address book, exit the program, and go back to the Find program and click *Find Now*. The right file will be the one with the most recent time.

Restoring the file on your new PC is trickier, because the new installation may look for a file with a different name and path. For instance, on the old setup, the file may be in C:\Windows\Application Data\Microsoft\Address Book\User-MPS.wab; and on the new one in C:\Windows\Profiles\Kent\Application Data\Microsoft\Address Book\kent.wab.

As described above, search for the name and location of the file in the new setup. Once you've found the file, note its name, and then rename it something like **holdit.wab**. Next, copy the old file to the same folder as the new one. If necessary, change its name to whatever the new file was before you renamed it. ▶

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KM-711L	17"/15.8"	1280 x 1024	OSD	.28mm
Performance Series				
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KM-711S	17"/15.8"	1600 x 1280	OSD	.26mm
KM-761	17"/16.1"	1600 x 1280	OSD	•.25mm
KM-810	19"/18.0"	1600 x 1280	OSD	.22mm (Horz)
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MUST SWAP FILES BE SO BIG?

I AM BAFFLED that *PC World* still recommends using a swap file two or three times the size of memory. If I upgrade to 96MB of memory (as I am about to do), do I need a 288MB swap file?

Bernard Kingsley,
Worcester, Massachusetts

MAYBE IT'S TIME to reevaluate our recommendation. Today's PCs have a lot more memory than they did even a year ago. On the other hand, programs hog more memory, and hard drives are bigger, so 288MB isn't the sacrifice it used to be.

If you're reluctant to give up that much hard drive space, try this test to determine whether you need to: Right-click *My Computer* and select *Properties*. Click the *Performance* tab, then the *Virtual Memory* button. Click the *Let me specify my own virtual memory settings* button (see **FIGURE 2**). Set the Minimum to 96, and the Maximum to the highest number allowed—this is your available hard drive space, so don't try to exceed it. When you're done, click *OK, Yes, Close,* and *Yes* to reboot your PC.

This way, your computer won't use more than 96MB unless it has to. But when it does need to, it will slow down.

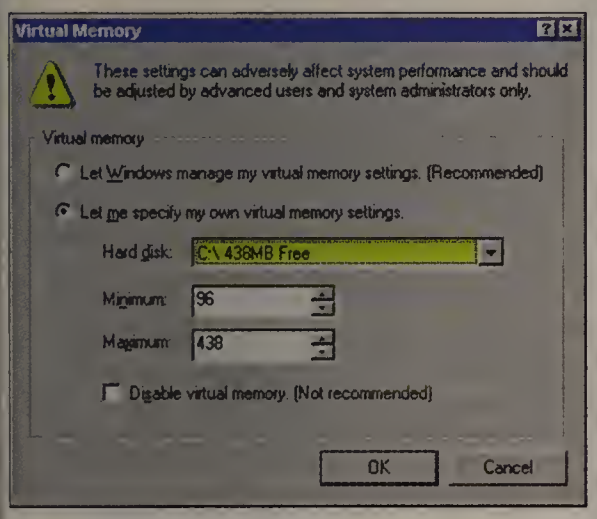
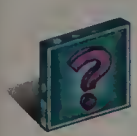


FIGURE 2: ADJUST VIRTUAL MEMORY settings to maximize your PC's performance.

After a few days of regular use, go back and set the minimum higher. If there's a significant performance improvement, stick with this new number.

A PORTABLE OUTLOOK



WHEN I USED Schedule Plus, I kept my addresses and contacts on a floppy disk so I could use them at home, work, and school. I now use Microsoft Outlook. Is there a way to keep the same info on a floppy so I can use it at any location?

Jerome P. Trojcak,
Salina, Kansas

ONCE AGAIN, we have to deal with the problem of Microsoft hiding data. The file you want is probably c:\windows\outlook.pst, but it could also be c:\exchange\mailbox.pst. The file is certainly *something*.pst. Just choose *Start•Find•Files or Folders* to find the file, then copy it to a floppy by right-clicking it and selecting *Send To•3½ Floppy (A)*.

When you bring the floppy to another computer, make sure that Outlook isn't running. Then find that system's .pst file, and copy the .pst file from the floppy disk over it, changing the name if necessary.

Of course, once you know where the files are on all three of your PCs, you won't have to go looking for them again. Better yet, you can automate the process of copying the .pst file and uploading it to another PC by replacing the shortcut you use to launch Outlook with a batch file like the one in **FIGURE 3**.

You can create this batch file in Notepad or any other text editor. Be sure to change the paths and file names as appropriate for your particular system. The file name on A: should be the same on all of your computers. Make sure there is nothing, not even a line return, after *cls*.

To save the batch file, select *File•Save As*, then select *All Files (*.*)* from the ▶

```
@echo off
copy a:outlook.pst c:\exchange\mailbox.pst
start /w "C:\Program Files\Microsoft Office\Office\Outlook.exe"
echo Make sure your Outlook floppy is in drive A:
pause
copy c:\exchange\mailbox.pst a:outlook.pst
cls
```

FIGURE 3: MOVING OUTLOOK FILES between two computers isn't easy, but a batch file like this makes the job tolerable.

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Best of Both Worlds in PowerDesk

WANT THE CONVENIENCE of Windows Explorer's folder-tree pane without giving up the real estate? If you're using Mijenix's PowerDesk Utilities 98, you can keep the folder tree turned off as a rule. Then, when you want to navigate to a folder, click the arrow next to the current folder's name in the drivebar, and voilà.

'Save as type' drop-down list, and name the file **outlook.bat**.

One last note: Outlook data files can become too big for a floppy disk. But luckily, they compress nicely with any zip-compatible compression utility. The only problem is that you won't be able to use outlook.bat to automate the copying unless you add some lines for running PKZip or any other command-line compression utility (and be sure to have that utility on each of your target systems).

Find files from this article at PC World Online's FileWorld (www.fileworld.com). Answer Line *welcomes questions and tips and pays $50 for published items. Humor columnist Lincoln Spector is a* PC World *contributing editor.* *See page 14 for contact information.* ■

COMING UP

IN NOVEMBER

PC RELIABILITY AND SERVICE

Dogged when your system was delivered DOA? Or dumbfounded when it booted up without a hitch? Disgusted with inept customer service? Or dazzled by quick, thorough attention from friendly service reps? Our survey of PC buyers tells the real story behind the reliability and service of business PCs, home machines, and notebooks.

TERRIFIC BROWSER TIPS

Whether you're irritated with Internet Explorer or annoyed with Netscape Navigator, we have cohabitation tips plus performance and navigation tactics. Here's how to optimize both browsers to get the best Web access possible.

TALK TO YOUR PC

Voice recognition systems have improved dramatically. We tried four continuous-speech packages, tested them for accuracy and simplicity, and found them tantalizingly close to becoming true productivity tools.

BUYING GIFTS ONLINE

Dreading the holiday crowds? Web storefronts are ready to sell CDs, videos, books, food, and wine—without the hassle of parking and rude salespeople. We rate our best and worst online shopping experiences.

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▶**Top 100:** Power and budget desktops, notebooks, and home PCs, plus the top printers, monitors, graphics boards, and modems.

▶**Sound Boards Shootout:** They're not just for games anymore. A sound card revolution lets you select boards for budget-minded business or high-end entertainment audio.

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Customize IE toolbars ◆ Add e-mail addresses to Outlook 97 ◆ Snag that Web page

Setting Up Newsgroups in Your Favorite Browser

I WANT TO READ Usenet newsgroups, but I'm having a problem linking to them. Every time I enter alt.*whatever*, an error message claims that I've entered the wrong DNS server. How do I find out what server to use?

Kenny Tan, Azusa, California

NEWSGROUPS ARE mighty handy if you have a technical problem to resolve, a special interest to discuss with other enthusiasts, or an issue to share with sympathetic listeners. And these days they are as easy to access as any Web page, since you don't need to install a separate newsreader program.

To set up a browser to read newsgroups, you must first tell it the name of the computer where your ISP stores newsgroup postings. For example, if your ISP's main address is bigisp.com, its newsgroup server may have a name like news.bigisp.com. Contact your ISP to learn the actual name.

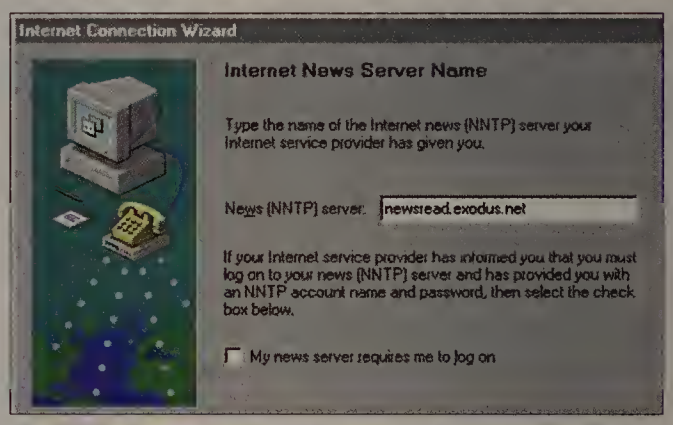
Once you've configured your browser to check the proper ISP server, download a complete list of current newsgroups. This process can take a few minutes—more than 25,000 newsgroups exist in cyberspace. Next, search that list for groups you want to read, and then subscribe to them. Once you've done all that, you can log on to the server and retrieve messages in the groups you've subscribed to. Here's how to manage this task in Internet Explorer and Netscape Communicator.

Internet Explorer: A setup wizard helps you connect to your provider's newsreader and download newsgroups:

1. Click the *Mail* icon on the standard toolbar and select *Read News* from the drop-down list. The Internet Connection Wizard will prompt you for your name, your e-mail address, and the name of the dial-up connection you use to link to your ISP (unless you are on a PC at work with a constant Net connection). Most important, it will ask you the name of the server on your ISP where news messages are posted (see **FIGURE 1**).
2. After the setup wizard is done, Outlook Express launches. It asks if you want to view a list of available newsgroups. Click *Yes*.
3. In the Newsgroups dialog box, first make sure that the *All* tab is selected; then in the 'Display newsgroups which contain' box, type a word describing the topic you're interested in—**orchids**, say. Next, pick a newsgroup from the resulting list, click *Subscribe*, and click *Go to*.
4. To read a message that's posted to the newsgroup, click its subject (see the right side of the bottom screen in Figure 1).
5. To read newsgroup messages in future sessions, click Internet Explorer's *Mail* icon, select *Read News*, and double-click the newsgroup name in Outlook Express.

Netscape Communicator: Follow these eight steps to identify where your ISP stores newsgroup messages, to subscribe to groups, and to download messages:

1. From the main menu, select *Edit•Preferences*. Click the plus sign next to 'Mail & Groups' in the 'Categories' list, select *Groups Server*, enter the name of your ISP's newsgroup server, and click *OK*.
2. Head to Netscape Mail by selecting *Communicator•Messenger Mailbox*.
3. To download a list of current newsgroups, select *File•Subscribe to Dis-* ▶



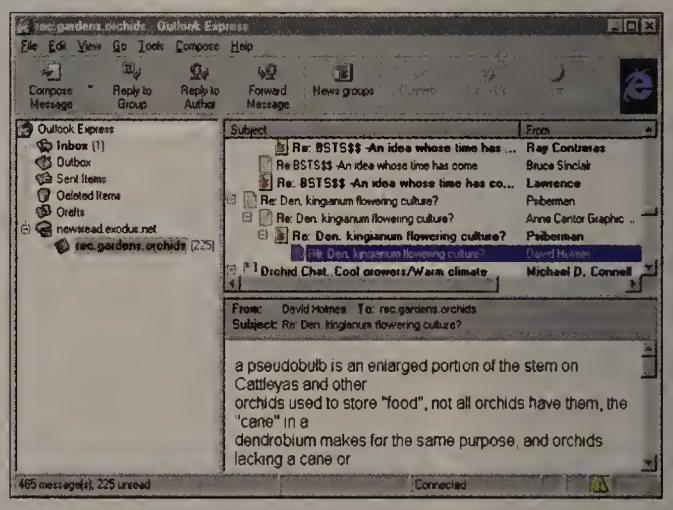
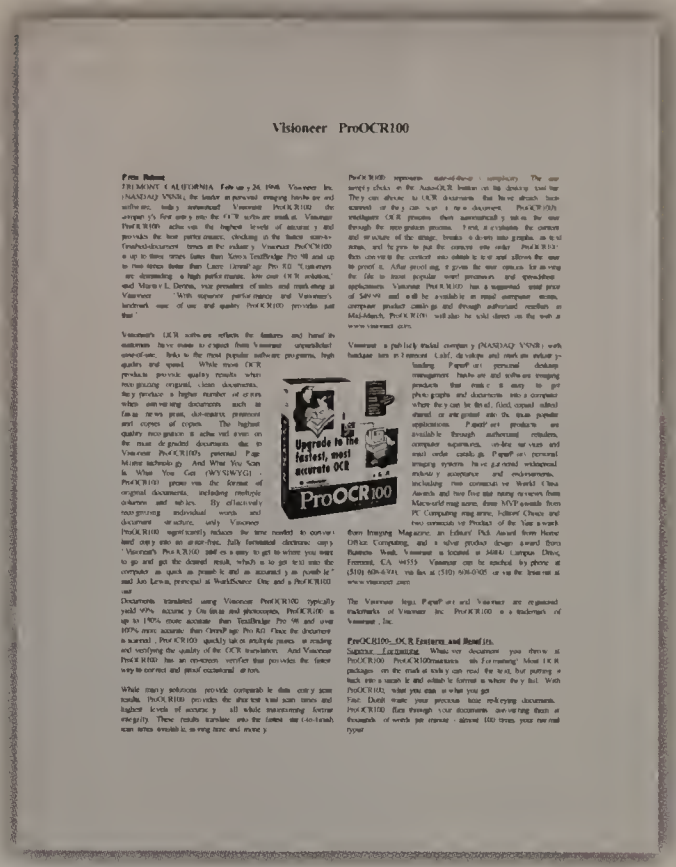


FIGURE 1: READ NEWSGROUPS from your browser by specifying the name of your ISP's newsgroup server.

ILLUSTRATION: JEFFREY PELO (TOP); JOHN BLECK (BOTTOM)

Personalize Navigator Bookmarks

SWAMPED IN BOOKMARKS? Put your favorites on the Personal toolbar: Click the *Bookmarks* icon on the Location toolbar and select *Edit Bookmarks*. Highlight the bookmark you want to put on the Personal toolbar, and drag it into the Personal Toolbar Folder. From the menu, select *View•Show Personal Toolbar*, if the toolbar is hidden. To remove a bookmark, click the *Bookmarks* icon, select *Edit Bookmarks*, click the plus sign next to the Personal Toolbar Folder, and drag the bookmark to the main list.



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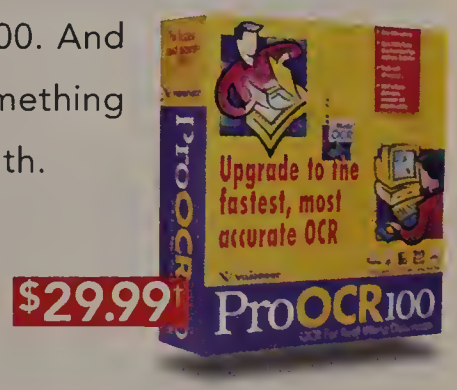

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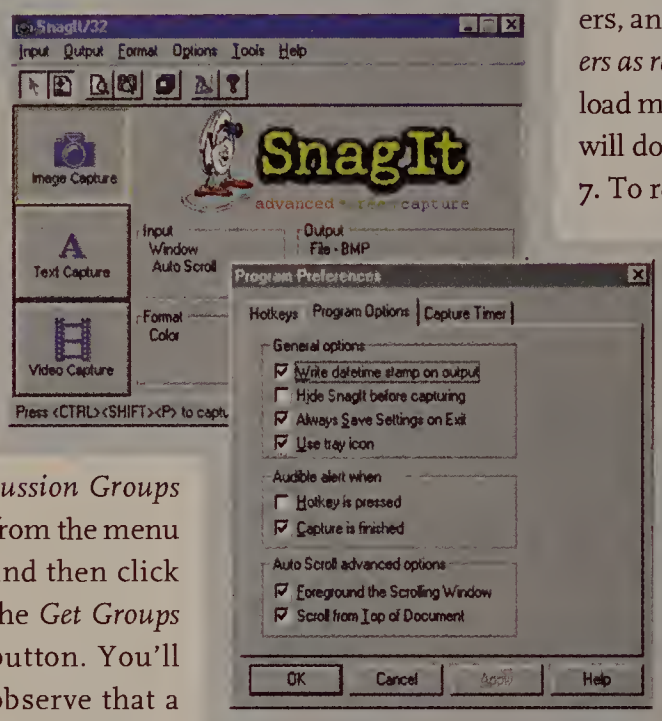
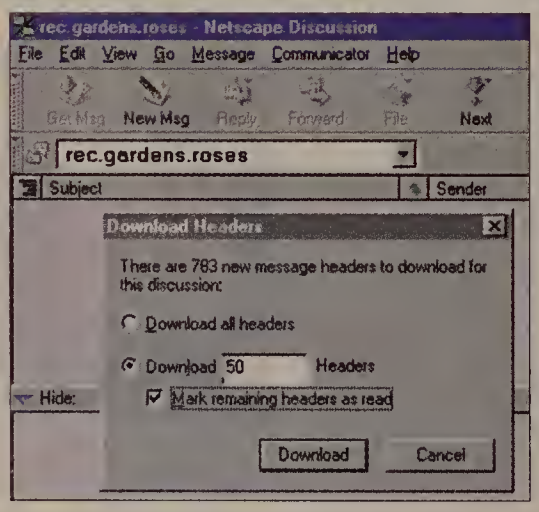


cussion Groups from the menu and then click the *Get Groups* button. You'll observe that a 'Receiving discussion groups' message appears at the bottom of the screen.

4. After downloading the list of newsgroups, you next have to click on the *Search for a Group* tab. In the 'Search for' box, type a single word that describes the topic you're interested in or the name of a Usenet newsgroup you wish to read. Remember, your browser searches newsgroup names, not content descriptions. Next, click the *Search Now* button.

5. Scroll through the list of discussion groups that the searcher found, highlight the one you want to read, and click *Subscribe*. A check mark will appear in the Subscribe column. Click *OK*.



6. To read the newsgroup, click the drop-down list in the Location toolbar, select the newsgroup, select *Download all headers* if you want to read all messages that have been posted, and click *Download* (see figure at lower left on this page). To download only a selection of messages, specify the number of headers, and check the *Mark remaining headers as read* box. The next time you download messages from the newsgroup, you will download only the newest ones.

7. To read a message, click its header.

8. To read new messages in the future, simply choose *Communicator•Messenger Mailbox*, select a newsgroup, and click the *Get Msg* icon in the Navigation toolbar.

BEAT NAVIGATOR'S PRINTER GLITCH

DON'T YOU HATE IT when you try to print a Web page and Navigator fires back, 'Nothing to print'? This glitch has persisted through several versions of the browser. To get Navigator to print your page, you must first select the entire page. Choose *Edit•Select All* from the menu, and then select *File•Print Frame*. Sometimes you can convince a balky Navigator to print by selecting *File•Print Preview* to display the page and then selecting *Print*.

TRANSFER ADDRESSES FROM E-MAIL TO OUTLOOK 97

I USE MICROSOFT Outlook 97 as my e-mail program, and I'm looking for an easy way to add the address from a message I receive to my address book. When someone sends me a message for the first time, I write down that person's e-mail address and type it into the address book. Is there a way to add the address to the Outlook address book automatically?

Robin L. Brown
Eden Prairie, Minnesota

YES. WHEN YOU RECEIVE a message from someone you wish to add to your address book, open the message and click on the e-mail address to send a reply message. When the New Message form pops up, right-click the e-mail address as it appears after 'To:'. As soon as you do that, a menu should pop up. Click *Add to Address Book* on this menu.

CUSTOMIZE YOUR IE TOOLBARS

THE QUICK LAUNCH toolbar that comes with Internet Explorer 4.*x* and Windows 98 puts icons for a few of Microsoft's

favorite applications on the Windows 98 taskbar. As Bob Harroun of Onarga, Illinois, writes, the toolbar is easy to customize. If you'd like to include some other handy Internet application (like a Web screen-capture program) in the Quick Launch bar, right-drag its icon to the Quick Launch bar, and select *Create Shortcut(s) Here*. For more toolbar tricks, see this month's *Windows Tips*.

MAKE ANTIVIRUS WORK ONLINE

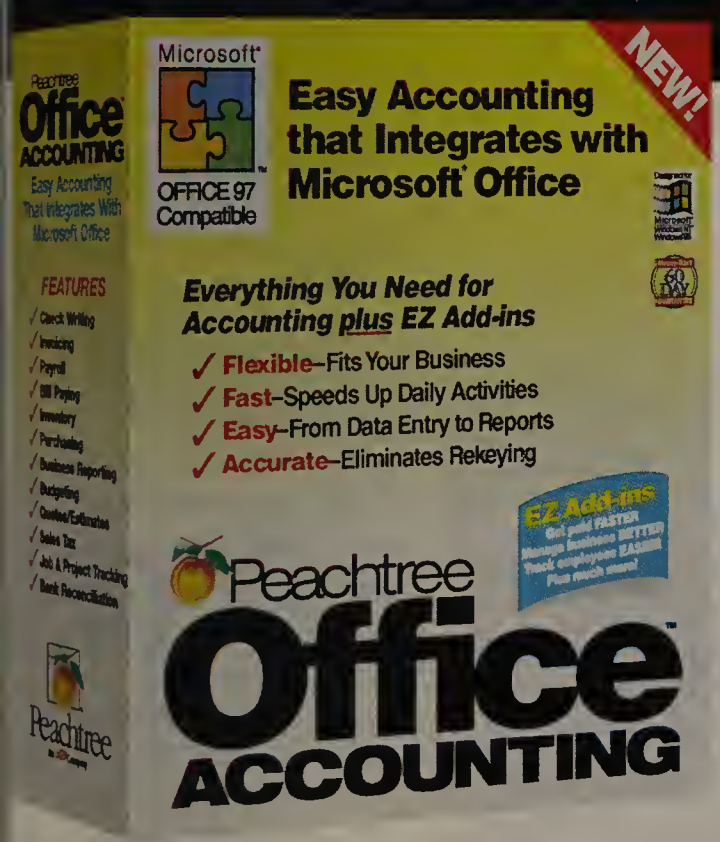
LANNY MARCUS OF Cali, Colombia, discovered that if you install any version of Netscape after installing Norton AntiVirus 2.01, AntiVirus won't scan files as they download from the Net. If you use a version of AntiVirus earlier than 4.0 (released last fall), Symantec suggests uninstalling and then reinstalling it whenever you install a new version of Netscape.

Sharon Ruckman, group product manager for Symantec's security and assistance business unit, says the bug was fixed in AntiVirus 4.0, which works as a plug-in with any version of Netscape without being reinstalled. AntiVirus doesn't work as a plug-in to Internet Explorer, however. You must use the utility's AutoProtect feature to scan files once you've finished downloading them from the Net.

Internet Tips *welcomes questions and tips and pays $50 for published items. Contributing Editor Judy Heim is a coauthor of* The Quilter's Computer Companion *(No Starch Press, 1997). See page 14 for contact information.* ■

See below.

See above.



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Save time with ruler tricks ◆ Create fancy logos ◆ Restore bad images

Simplify International Characters in Word 97

IF YOU FREQUENTLY type documents that contain accented letters or other international characters, you can work from the Windows International Keyboard, rely on the Insert•Symbol menu command, or type the character's code on the number pad while holding down the <Alt> key. All three methods work, but they're unduly complicated and require additional time or a good memory.

Word 97 offers a better solution: It lets you add the characters you use frequently to Word's menus. You can create entries for a handful of characters, or you can include a full set. You can even tack on other symbolic characters by following the same instructions:

1. In a blank document, select *Tools•Customize*. In the Customize dialog box, click the *Commands* tab; then scroll down the *Categories* list and select *New Menu*. Click and hold on the *New Menu* entry in the Commands list, then drag the mouse up to the menu bar in Word. I suggest dragging it to the 'Insert' menu command. This will make the Insert menu drop down. Drag down through the menu until the line representing the insertion point is positioned where you want to insert the new menu command; then release the mouse button. Your new item will appear in the menu.

2. Back in the Customize dialog box, click *Modify Selection*, replace the text in the Name box on the menu with **International Characters**, and press **<Enter>**. Click *Insert* on the menu to close it.

3. In the Customize dialog box, select *All Commands* in the Categories list; then select *Symbol* in the Commands list.

4. Click and hold on *Symbol* in the Commands list, and drag the new mouse pointer up to the Insert menu, down to the new International Characters menu item, and into the box that appears to the right of that item. In the resulting Symbols dialog box (you may have to drag it to the right to see all of it), select *(normal text)* from the top of the Font drop-down list, click on the character you want to add to the submenu, and click *OK*. The ANSI character code of the symbol will appear in the submenu (see **FIGURE 1**). Click *Modify Selection* in the Customize dialog box. Select everything in the Name field of the pop-up menu. Next, hold down the **<Alt>** key and, using the number pad, type a **0** (zero) plus the three-digit ANSI code. Release the <Alt> key and press **<Enter>** to insert the character into the menu. Repeat this step for any other characters you wish to add. When you're finished, close the Customize dialog box. Word will save your new menu in normal.dot, making it available in all documents.

5. To use your new commands, select *Insert•International Characters*, and select a character.

Note: If you make a mistake while working with Word's menus, you can simply drag the erroneous menu command off the menu and drop it on the document window, as long as the Customize dialog box is visible.

The file intchars.dot, which contains a complete set of international characters, is available on PC World Online. ▶

Control Word's Recently Used File List

BY DEFAULT, Word's File menu displays a list of the four most recently edited files. If you'd rather see more files listed (or fewer), just select *Tools•Options* and click the *General* tab in the Options dialog box. Click the arrows to the right of the 'Recently used file list' check box to increase or decrease the number of files shown. Or clear the check box to disable the list, if you prefer. Click *OK* to implement the change.

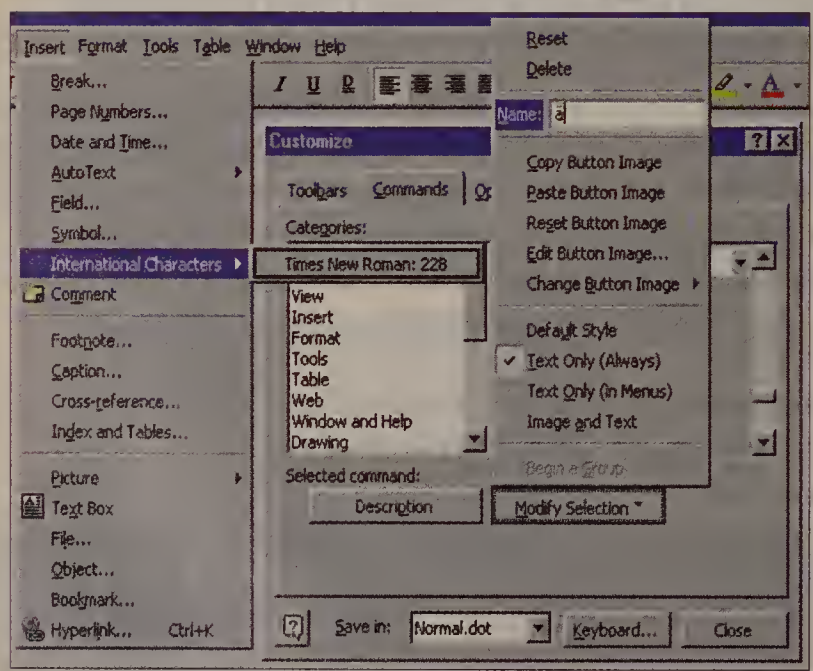


FIGURE 1: AVOID TYPING LONG KEY COMBINATIONS by adding frequently used symbols to Word 97's menu. Here, international characters appear on a submenu of the Insert menu.

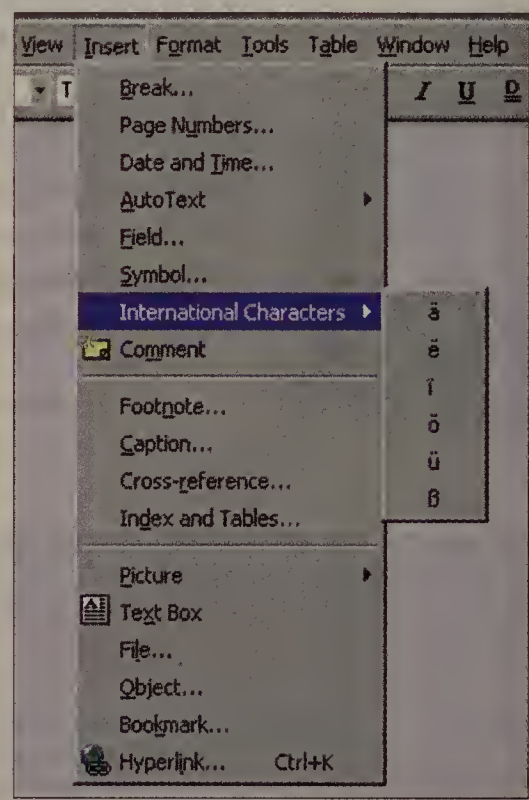


ILLUSTRATION: JEFFREY PELO

Large Screens go Mainstream

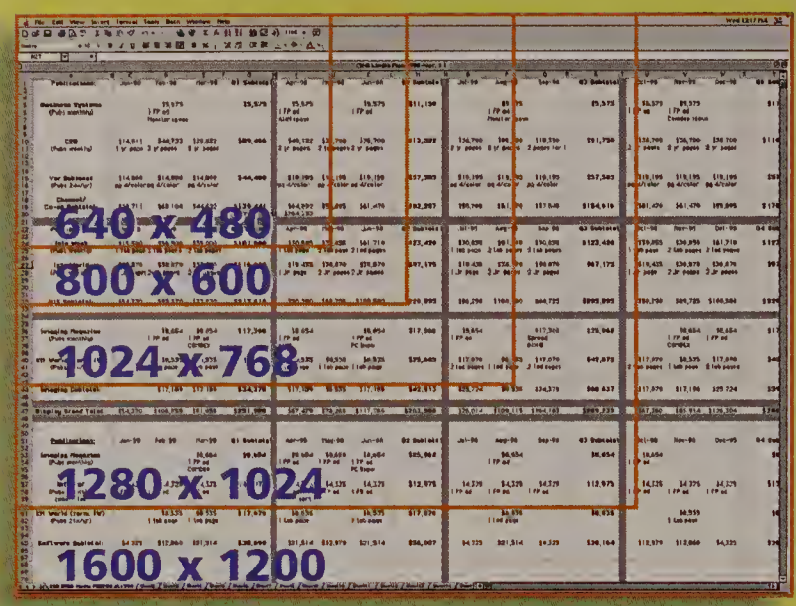
19+ inch monitors extend their presence across the enterprise

Today's operating systems have transformed the desktop into an environment where it's easy to work in many applications at once—if you've got the screen space to accommodate all the open windows.

Today's 32-bit architectures and networking capabilities have shifted the focus of the information age. Thanks to the Internet and the movement from DOS to Windows, what was once a text-based, one-application-at-a-time environment is now a visually rich space where a multitude of windows may be open at once. Today's systems let you routinely move among programs on the fly—from the browser to a spreadsheet and on to a database. These advances have changed the way we view and use information. They have also placed desktop real estate at a premium and increased the need for displays that can effectively handle visual detail.

Big screens deliver big benefits

Because of these changes, people who spend their day looking square in the face of a monitor are recognizing the deficiencies of traditional displays. These "knowledge workers" are moving to large-format, 19-inch and larger displays for the benefits they offer. By working with high-resolution monitors they are discovering the increased productivity that comes with viewing multiple windows simultaneously and reading on-screen documents faster. This productivity boost lets people work longer and more comfortably and ultimately translates into faster time to market and better customer service. And because a quality, high-resolution monitor can eliminate the blurry and fuzzy text and images of



A larger and higher resolution screen increases productivity by letting you view more information at one time. This graph shows the increased portion of a spreadsheet that can be viewed when using higher resolutions on a large-screen monitor.

traditional models, there are fewer physical problems associated with eye strain and fatigue. Over time that can save money with less employee time off and fewer medical expenses.

Given these pluses, it's no surprise to learn that 19 to 21-inch monitors are the fastest-growing segment in the display market. And with prices coming down, large screens are now appearing in a broad variety of corporate settings.

Seven features you should look for in selecting a large-screen monitor

Selecting a large-screen monitor that's appropriate for your business should go well beyond a simple comparison of cathode ray tube (CRT) size and maximum viewable area. With so many monitors that appear comparable, how do you choose one that maximizes the productivity gains that the large-screen format promises?

1 Consistent Image Quality—When you go from a 15-inch screen to a 19-inch or larger version, you'll experience better image quality no matter what brand you choose. But does that quality drop off at the edges? The ability to generate consistent, sharp images from edge-to-edge depends on the quality of the gun that is used to fire electron beams at the CRT faceplate. With many monitors, the spots created by the electron beam grow larger and distorted at the edge—creating poor focus and decreasing the legibility of text. For edge-to-edge image quality, look for a monitor whose electron gun technology—such as Cornerstone's SuperFocus process—produces small, round spots and has the ability to dynamically correct the electron beam shape at the screen's edge.

2 High Bandwidth—Resolution and refresh rate are key specifications. As resolution increases, the refresh rate (the times per second that a screen is "repainted") falls inversely. So the higher the resolution, the lower the refresh rate, unless you have sufficient subsystem bandwith. Anything below 85 Hz will produce screen flicker, causing eye fatigue. What's needed to support your desired resolution while achieving a minimum refresh rate of 85 Hz is sufficient subsystem bandwidth.

Do you need a new graphics controller card?

All 19-plus-inch monitors deliver imagery superior to that of their smaller counterparts right out of the box. However, matching a monitor with an advanced graphics controller can increase the monitor's performance. For this reason, it's recommended that you evaluate your existing controller card to determine if it has the features that will get the most out of your new purchase. If you decide to replace your card, select one that handles resolutions of up to 1800 x 1440 for high legibility as well as one with enough bandwidth to optimize the refresh rate. For better results, choose a card that was specifically designed to work with your monitor's subsystem. For instance, the new Image*Accel 4* controller card from Cornerstone will work with any monitor to deliver speed, clarity, shift-on-the-fly resolution switching, and 250 MHz video bandwidth for flicker-free refresh rates. But when the Image*Accel 4* is teamed with a Cornerstone monitor, users also benefit from an expanded selection of resolution-refresh rate combinations plus increased ease of use.

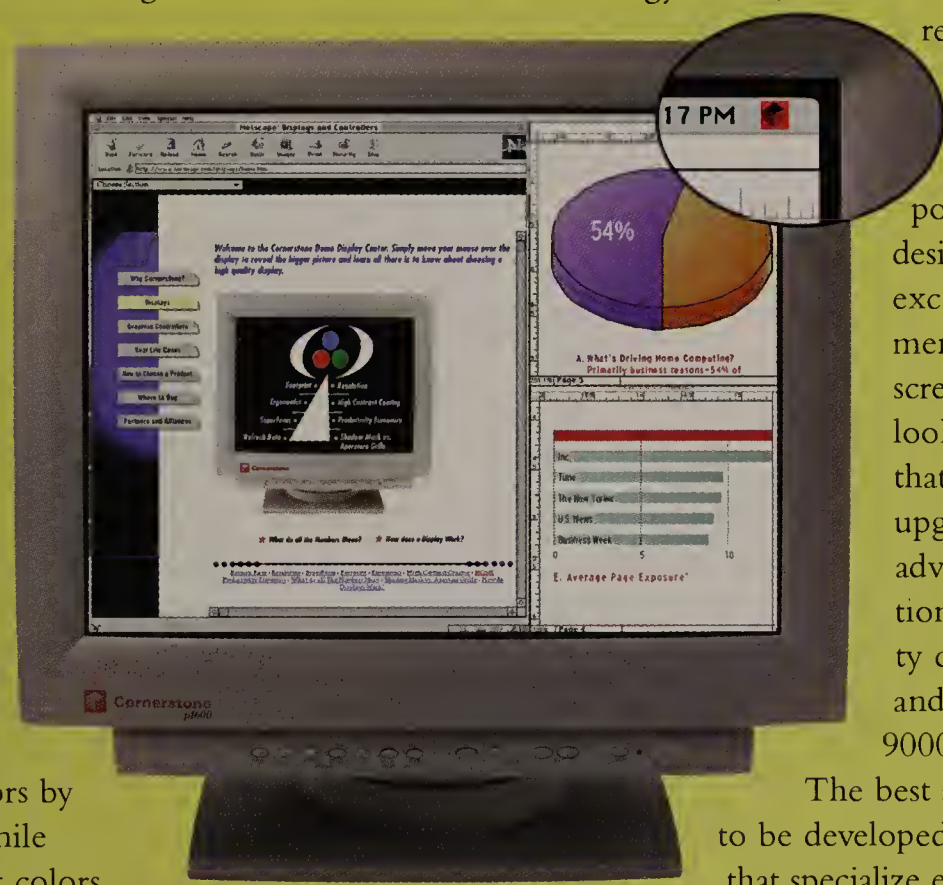
The Image*Accel 4 graphics controller card is designed to maximize productivity. When optionally matched with a Cornerstone monitor, it provides ultimate performance and ease of use.*

*Horizontal Scan Frequency

Resolution	Refresh Rate	Bandwidth Required*
1856 x 1392	80 Hz	130 kHz
1600 x 1280	85 Hz	117 kHz
1600 x 1200	85 Hz	107 kHz
1280 x 1024	85 Hz	95 kHz
1024 x 768	85 Hz	70 kHz

Be sure to select a monitor with enough bandwidth to support your resolution needs.

3 High Contrast—There's nothing more legible than crisp, black text on bright, white paper. A monitor that's well designed can come very close—if it provides enough contrast. To deliver a level of contrast that replicates the readability of paper documents, Cornerstone uses high-contrast Direct Faceplate coatings on the inside of the screen and Crystal Pigment coatings around the phosphors. The result: a contrast ratio that exceeds non-coated monitors by nearly 10 percent, while delivering rich, vibrant colors.



Cornerstone's SuperFocus electron gun technology corrects electron beam distortion to provide razor-sharp images up to the very edge of the screen.

4 Tight Dot Pitch—To pick up the finest gradations of color, tone, and texture requires tight dot pitch such as that provided by Cornerstone's shadow mask technology. For optimum viewing, choose a monitor with a phosphor dot pitch range of 0.25 - 0.27 mm and a horizontal dot pitch of 0.22 mm.

5 Small Footprint—Some large-screen monitors will take over your entire desktop.

With Cornerstone's Short Neck design, a 19-inch monitor (front) significantly reduces the desk space required as compared to a standard 19-inch (back).

If your space is limited, look for solutions such as Cornerstone's Short Neck design which utilizes a 100 degree deflection yoke to allow a 19-inch model to have the same depth as many 15-inch monitors. Additional innovations like beveled rear corners, right angle cables, and Short Depth Cabinet layouts have reduced the physical depth of 21-inch monitors by up to two inches which allows users to place them further back in their work space.

6 Quality Components—Many large-screen monitors have the same components in a 21-inch model as found in the 17-inch line. While the technology works, it does not achieve the best results. That's why it's important to look for a monitor whose components have been designed to meet or exceed the requirements of the large-screen format. Also, look for technology that is frequently upgraded to take advantage of innovation. Ask about quality control procedures and check for ISO 9000 certification. The best subsystems tend to be developed by companies that specialize exclusively in the large-screen format.

7 Professional Service and Support—If you're purchasing a monitor for business purposes, you'll want service and support geared for the professional user. Many brands have a retail heritage that has equipped them to serve the needs of the consumer market very well. But for service that understands the impact that downtime can have on business-critical operations, look for a brand that is devoted to the professional market. That's the best way to assure you'll receive advanced support options like on-site service and overnight replacement.

For more information about Cornerstone high-resolution monitors and controllers, call (800) 562-2383 ext. 11 or find them on the Web at www.BigMonitors.com

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AUTOTEXT SHORTCUTS IN WORD 97

WE ALL TYPE certain things over and over: letter salutations and closings, mailing instructions, dates, times, and other standard text. Word 97 offers a little-used technique that can save you time and may even suggest new possibilities for these common phrases. Just select *Insert•AutoText* and hover the mouse over one of the categories. Click the item to insert it at the current cursor location.

TAB TRICKS IN WORD AND WORDPERFECT

YOU KNOW that you can insert a new tab just by clicking on the ruler at the top of a document. Here are some less widely known ruler tricks that can save tons of time in tabulated documents:

Word 95 and 97: If the ruler doesn't appear, select *View•Ruler*.

• Remove a tab by dragging its marker off the ruler and dropping it in the document.

• Find the exact position of a tab by clicking on it with both left and right mouse buttons. This displays measurements from both margins. With the buttons held down, you can drag the tab to a new spot.

• Select the tab alignment by clicking the *Tab Type* button on the far left side of the ruler to cycle through left, right, centered, and decimal tab styles. Then click on the ruler where you want the tab to appear.

• You can also change the tab alignment and other tab settings by double-right-clicking the tab marker. This displays the Tabs dialog box, where you can specify the precise tab position and select a leader style (see **FIGURE 2**). In Word 95, ordinary double-clicking also displays the Tabs dialog box. In Word 97, normal double-clicking displays the Page Setup dialog box.

FIGURE 2: DOUBLE-RIGHT-CLICK a tab marker to specify its position more precisely in a dialog box.

• Set tabs for all paragraphs at once by first pressing **<Ctrl>-A** to select the entire document. Otherwise, your tab settings will affect only the current paragraph.

• Set tabs for a specific group of paragraphs by first selecting those paragraphs.

WordPerfect 6.1 and later: If the ruler doesn't appear, select *View•Ruler* (in WordPerfect 7, *View•Toolbars/Ruler*).

• To remove a tab, drag it off the ruler and drop it on the document.

• Clear all the default tab settings (so that they don't conflict with your customized settings) by right-clicking under the line on the ruler and selecting *Clear All Tabs* from the menu. To restore the default settings, right-click again and select *Default Tab Settings*. (In WordPerfect 6.1, right-click under the ruler line, select *Tab Set*, click the *Default* button, and click *OK*.)

• Before setting any tabs, right-click under the ruler and choose one of eight alignments. Left-aligned tabs are the default.

• Insert a new tab by clicking under the line where you want the tab to appear. For precise positioning, click and hold the tab and drag it, watching the measurements on the ruler or in the status bar.

• Change the alignment of a tab by right-clicking the tab, selecting a new alignment from the menu, then left-clicking the original tab.

• Set tabs for only part of a document by first selecting the text. Otherwise, your tab settings will affect everything from the cursor location to the end of the file.

CREATE MONOGRAMS IN WORDPERFECT

A COOL FEATURE in WordPerfect versions 6.1 and later lets you overlap one character with another. While it's not practical for your everyday tasks, you can use this feature to create unusual monograms or company logos. Here's how:

1. Position the cursor where you want the monogram.
2. Select *Format•Typesetting•Overstrike*.
3. In the Overstrike dialog box, type the characters you want to use. Normally, more than two characters do not show up well, but you can experiment. (To include a symbolic character, press **<Ctrl>-W** while in this dialog box; this opens the Symbols dialog box.) Click *OK*.

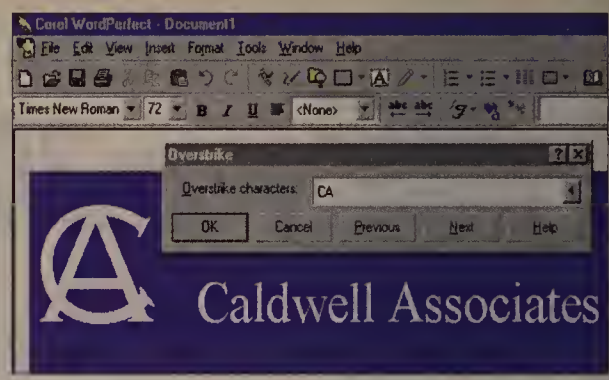

FIGURE 3: CREATE COMPANY logos or monograms with WordPerfect's Overstrike feature.

Once the monogram appears in your document, WordPerfect treats it as a single character. Select it, and then select *Format•Font* to choose a font and size for the character. You can also use boldfacing, italics, shadows, or font colors for other effects (see **FIGURE 3**).

Note: What you see on the screen with these monograms may not be exactly what you get on your printer. Print a test page and make adjustments as necessary.

FIX BROKEN IMAGES IN WORDPERFECT

WORDPERFECT COMES with a hefty set of image manipulation tools that let you import clip art or other images into your documents and tweak them as you like. But what if you've made a hash of an image and you can't remember what you did to foul it up?

Just right-click the image, select *Image Tools* from the resulting pop-up menu, and click *Reset Attributes*. Note: In WordPerfect 6.1, the Reset Attributes option is an icon on the Image Tools floating palette, which pops up when you right-click the image.

Find files from this article on PC World Online (www.fileworld.com). Word Processing *welcomes questions and pays $50 for published items. Contributing Editor George Campbell is a contributor to* The PC Bible *(Peachpit Press, 1995). See page 14 for contact information.* ■

THE SCANNER THAT ATE THE TRANSPARENCY ADAPTER!

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input and output
Full 36-bit color
input and output

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The scanner's 36-bit color depth (input and output), 600 x 1200 dpi optical resolution (up to 9600 dpi enhanced) and superior optics deliver performance suitable for any company's graphic needs. And for quick, conflict-free installation, the ScanMaker 4 includes the ***Adaptec 2902E PCI SCSI interface card***. All this and some great software for a suggested retail price of only $699. It's almost like getting two scanners for the price of one.

ScanMaker 4

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- 3 long-life cold cathode lamps
- Adaptec 2902E PCI SCSI interface card
- 600 x 1200 dpi optical resolution / 9600 dpi enhanced
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Calculate the Difference Between Two Dates in Excel

ONE OF EXCEL'S handiest worksheet functions—Datedif—is undocumented. Datedif returns the difference between two dates, expressed in years, months, or days. You might use the Datedif function to calculate how many months the payment on an invoice is overdue or to count down the number of years, months, and days until the millennium.

Excel's Datedif function is identical to Lotus 1-2-3's @Datedif function and takes three arguments. Its syntax is:

=datedif(*start_date,end_date,units*)

where *start_date* is a date or a reference to a date, *end_date* is a date or a reference to a date, and *units* is a one- or two-digit string (in double quotes) specifying the units for the difference between the two dates (see **FIGURE 1**). **FIGURE 2** shows an example of the Datedif function in use.

CREATE A DROP-DOWN LIST OF POSSIBLE INPUT VALUES

IF YOU'RE creating a worksheet that will require user input and you want to minimize data entry errors, use Excel's data validation feature to add a drop-down list. The best part about it is that you don't have to write any macros.

Phil Schmaltz, Bismarck, North Dakota

Data validation, which debuted in Excel 97, is an excellent way to ensure that a cell entry is of the proper data type (text, number, or date) and within the proper numeric range. The drop-down list produced with the feature appears when a user clicks the cell (see **FIGURE 3**).

Here's how to create a drop-down list:

1. Type the list of valid entries in a single column. If you like, you can hide this column (select *Format•Column•Hide*).
2. Select the cell or cells that will display the list of entries.
3. Choose *Data•Validation*, and select the *Settings* tab.
4. From the Allow drop-down list, select *List*.
5. In the Source box, enter a range address or a reference to the items that you entered in step 1.
6. Make sure the *In-cell dropdown* box is selected.
7. Click *OK*.

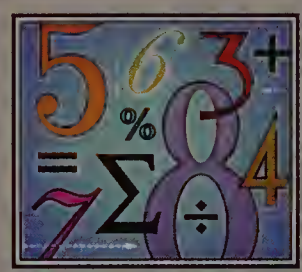
If your list is short, you can skip step 1 and type the list entries directly in the Source box in step 5, separating items with a comma.

The Data Validation dialog box has two other tabs. Click *Input Message* to add a prompt that will appear when a user selects a cell. Click *Error Alert* to specify a custom error message if the user's entry is invalid.

The handy data validation feature suffers from one serious flaw. If you paste an entry into a cell that uses data validation, the validation isn't performed. And if you select that cell again, the drop-down list no longer appears. Fortunately, you can circumvent this problem by protecting the worksheet: Select *Tools•Protection•Protect Sheet*.

Spreadsheets *welcomes questions and tips and pays $50 for published items. Contributing Editor John Walkenbach is the author of nearly two dozen books and The Spreadsheet Page (www.j-walk.com). See page 14 for contact information.* ■

Use Dummy Arguments in Excel

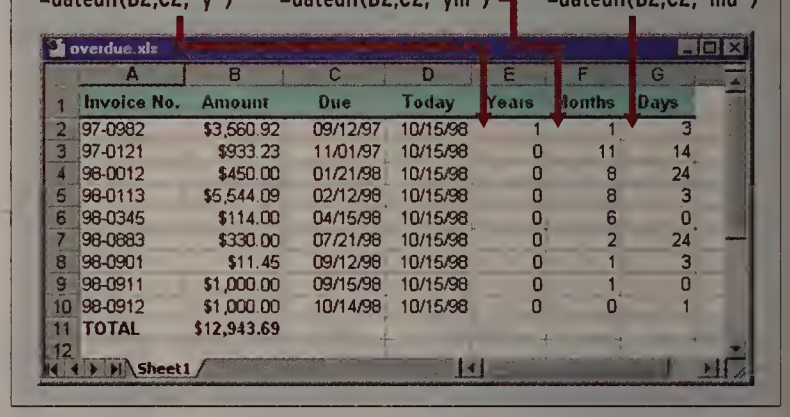


DO YOU HAVE TROUBLE remembering the syntax of Excel functions? You could select Insert•Function, choose a function, and fill in the arguments in the resulting dialog box. But it's often faster to type the function's name and then press <Ctrl>-<Shift>-A to paste in "dummy" arguments. For instance, if you type =Pmt into a cell and then press <Ctrl>-<Shift>-A, you'll get the formula '=PMT(rate, nper,pv,fv,type)'. Replacing the dummy arguments with the actual arguments then generates the calculation you need.

UNITS ARGUMENT

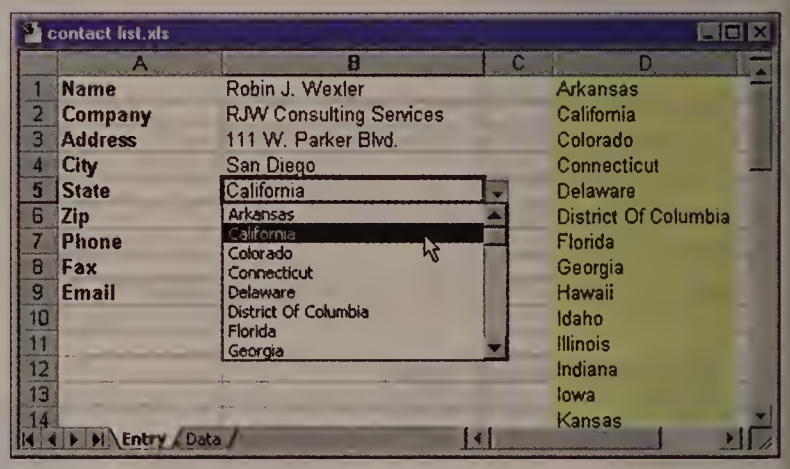
Unit symbol	Returns the number of...
"y"	full years in the period
"m"	full months in the period
"d"	full days in the period
"md"	full days in excess of the last full month
"ym"	full months in excess of the last full year
"yd"	full days in excess of the last full year

FIGURE 1: EXCEL'S DATEDIF FUNCTION calculates the difference between dates any way you like.



	A	B	C	D	E	F	G
1	Invoice No.	Amount	Due	Today	Years	Months	Days
2	97-0982	$3,560.92	09/12/97	10/15/98	1	1	3
3	97-0121	$933.23	11/01/97	10/15/98	0	11	14
4	98-0012	$450.00	01/21/98	10/15/98	0	8	24
5	98-0113	$5,544.09	02/12/98	10/15/98	0	8	3
6	98-0345	$114.00	04/15/98	10/15/98	0	6	0
7	98-0883	$330.00	07/21/98	10/15/98	0	2	24
8	98-0901	$11.45	09/12/98	10/15/98	0	1	3
9	98-0911	$1,000.00	09/15/98	10/15/98	0	1	0
10	98-0912	$1,000.00	10/14/98	10/15/98	0	0	1
11	TOTAL	$12,943.69					
12							

FIGURE 2: CALCULATE ELAPSED TIME in years, months, and days by entering three Datedif formulas with different units.



	A	B	C	D
1	Name	Robin J. Wexler		Arkansas
2	Company	RJW Consulting Services		California
3	Address	111 W. Parker Blvd.		Colorado
4	City	San Diego		Connecticut
5	State	California		Delaware
6	Zip	Arkansas		District Of Columbia
7	Phone	California		Florida
8	Fax	Colorado		Georgia
9	Email	Connecticut		Hawaii
10		Delaware		Idaho
11		District Of Columbia		Illinois
12		Florida		Indiana
13		Georgia		Iowa
14				Kansas

FIGURE 3: HAVING A DROP-DOWN LIST of valid entries for an input field minimizes data entry errors in Excel 97.

ILLUSTRATION: JEFFREY PELO

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Dot Pitch	0.26mm	0.26mm	0.27mm
Max. Resolution	1600 x 1200	1280 x 1024	1280 x 1024
Optimal Resolution	1280 x 1024 @ 89Hz	1024 x 768 @ 87Hz	1024 x 768 @ 87Hz

Computer Shopper Top 100 1997 — Optiquest V75 October 1997

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Avoid removable-storage drive bugs ◆ Pick the right motherboard

Replacing Floppies—What's Right for You?

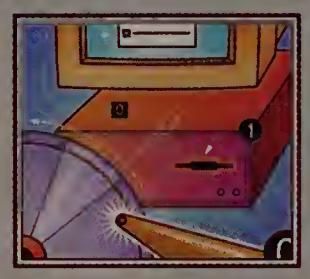
EVERYTHING'S CHANGED. CPUs sizzle, hard drives are huge, files are fat, and floppy drives...well, floppy drives are just what they've always been: small and slow.

Fortunately, many removable storage products bridge the gap between the 1.44MB floppy and today's multigigabyte hard disks (see "Put a Gig in Your Pocket," March). And a couple make excellent floppy replacements. But choosing the right one involves looking at more than megabytes and dollars.

THE DECIDING FACTORS

IF YOU BACK UP lots of data regularly—all the contents of a 1GB hard drive, for example—you need a removable hard drive. SyQuest's SyJet and Iomega's Jaz offer cartridges of a gigabyte or more, good data transfer rates, and low per-megabyte costs. Pick a drive by balancing the size of your data against the size of your pocketbook.

But removable drives don't completely substitute for the old floppy. Because the cartridges are based on hard disk technology, they're expensive and delicate. And since there's no cartridge standard, you probably won't be able to swap data with many of your friends or colleagues.



If your needs are more moderate—for example, backing up or swapping big individual files such as graphics or multimedia presentations—you'll do fine with Iomega's 100MB Zip drive or with a 120MB drive that uses LS-120 ("SuperDisk") technology (Imation and several other companies make them). These two alternatives are vying to succeed the floppy drive and become standard on high-end systems from vendors like Compaq and Hewlett-Packard.

Which is better?

Zip drives enjoy the advantage of already being everywhere, which makes them the choice for anyone who wants to share files with many other users.

But LS-120 drives offer the all-in-one convenience of reading and writing both 1.44MB floppy disks and their own 120MB disks (though a traditional floppy drive may not be able to read a 1.44MB floppy formatted on a parallel port LS-120 drive). And the LS-120 boasts a small size advantage over the Zip disk (see **FIGURE 1**).

Both Zip and LS-120 force you to make some trade-offs regarding the type of data connection. If you're buying an external drive, you can choose either a SCSI or a parallel port model. SCSI carries with it the hassle of buying and installing a SCSI adapter (if you don't already have one), but it's also a lot faster. Parallel port drives typically run at around 300 KBps (taking approximately 2 minutes to transfer the whole disk); SCSI drives can move data at more than three times that rate.

And if you don't mind popping the top off your PC, you can achieve data rates of better than 1 MBps by purchasing and installing an internal EIDE model of either a Zip or LS-120 drive.

The next time I buy a new computer, I'll probably ask the vendor to install an internal EIDE drive, a type that tends to be slightly cheaper than external SCSI or parallel port drives. I prefer the convenience of a 1.44MB-floppy–compatible LS-120 drive. But if the manufacturer doesn't offer that option, I'll choose an internal EIDE Zip drive rather than installing an LS-120 myself—in order to avoid potential compatibility bugs and other troubles.

SQUASH BUGS

LS-120, ZIP, AND other removable storage devices have had their share of growing pains. So do a little quick ▶

When Silence Isn't Golden

NOT GETTING SOUND from your speakers?

Check the obvious. Is the power to the speakers on? Are the speakers properly connected to your sound card? Is the speaker's volume knob on a middle setting?

Check sound settings. Click the speaker icon on the right side of the Windows Taskbar, set the control bars to the center, and see that none of the Mute boxes are checked.

Check the sound card volume control. Some sound cards have a volume control knob that can inadvertently be rotated.

REMOVABLE RIVALS: LS-120 VS. ZIP

DRIVE	Price	Vendors	PC vendors that sell as option or standard	Installed base	Comments
LS-120	EIDE $79–$99, parallel port $149, SCSI $170–$240	Digital Research, Hi-Val, Imation, Winstation	Compaq, Gateway, HP, IBM, NEC, others	2 million	Reads (but parallel port models may not write) standard 1.44MB floppies.
Zip drive	EIDE $99, parallel port $139, SCSI $139–$149	Iomega	almost all	15 million	Established the product category and remains the most popular choice.

FIGURE 1: THE TWO MAIN CONTENDERS for large-capacity floppy drive replacements offer different strengths.

ILLUSTRATION: JEFFREY PELO (TOP); JOHN BLECK (BOTTOM)

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- Synaptics® TouchWriter™ Pointing/Writing Device
- Modular Bay supporting Diskette Drive, LS-120, CD-ROM, Zip,™ DVD-ROM
- Simultaneous use of Diskette Drive and Modular Bay
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CHOOSE THE RIGHT INTEL CHIP SET

CHIP SET	Code name	CPUs supported	Memory types supported	Comments
430HX PCIset	Triton II	Pentium	EDO, FPM	Faster than VX or TX when using more than 64MB of memory, if BIOS enables.
430VX PCIset	none	Pentium	EDO, FPM, SDRAM	Caches only first 64MB of memory; better for desktop PCs.
430TX PCIset	none	Pentium MMX	EDO, FPM, SDRAM	Caches only first 64MB of memory; better for desktop PCs, Ultra-DMA hard disks, MMX CPUs.
440FX PCIset	Natoma	Pentium Pro, Pentium II	EDO, FPM	Supports both Pentium II and Pentium Pro.
440EX AGPset	none	Celeron	EDO, FPM, SDRAM	Simpler, cheaper version of 440LX.
440LX AGPset	none	Pentium II	EDO, SDRAM (66 MHz)	Supports AGP, Ultra-DMA hard disks.
440BX AGPset	none	Pentium II	SDRAM (66 or 100 MHz)	Supports AGP, 100-MHz system bus, Ultra-DMA hard disks.

FIGURE 2: INTEL'S CHIP SETS and their motherboards support a wide range of features.

homework before you buy, and you'll avoid (or at least minimize) bugs and incompatibilities. Search Microsoft's Knowledge Base (support.microsoft.com/support) for details on your specific drive. For example, Windows 95 has problems recognizing removable IDE drives in Windows Explorer. You'll find instructions for applying the fix in Article ID: Q153471 of Microsoft's Knowledge Base.

If you're booting from a removable drive (so that multiple users can share the PC or one user can run multiple operating systems), you should know about a bug in Windows 95's original release (OSR1). Performance can be slowed dramatically by a bug on some IDE and SCSI drives from Iomega and SyQuest and on some laptops using various removable hard drives. Instead of loading the 32-bit protected-mode drivers that Windows 95 normally uses to control virtual memory, OSR1 uses the older and much slower DOS-mode drivers.

To check, open Control Panel and click the System icon and then the *Performance* tab. If it says '32-bit' next to Virtual Memory, you're okay. If not, the fix is to force virtual memory to reside on your hard disk. To do this, go to the *Performance* tab and click the *Virtual Memory* button.

On removable drives with pass-through parallel port connectors, watch out for a common conflict between an attached printer and the drive. Several makes of printers that send data back to the PC, including HP models, can confuse both the external drive and Windows 95 so that the drive is not recognized. You can usually solve this problem by installing an updated printer driver. Always check with your printer vendor for potential incompatibilities before attaching a removable drive. Better yet, avoid the problem entirely by purchasing a SCSI or IDE drive.

For more on installing removable-cartridge drives, see August's *Upgrade Guide.*

ADOPT THE RIGHT MOTHERBOARD

ARE YOU TECHNICALLY hip, ready for a more powerful PC—but strapped for funds and considering building your own PC from scratch? Here are two tips on the most important step: picking the right motherboard.

Buy a name brand. The most important issue in buying a motherboard is compatibility. Poorly designed or insufficiently tested motherboards can suffer from unstable performance or hard-to-track-down problems that might not reveal themselves until after you've installed that expensive new video card or hard disk.

If you're building your own PC, the best way to avoid problems is to buy from an established motherboard manufacturer such as ASUS, Intel, or SuperMicro. The larger companies offer better support and downloadable BIOS upgrades to correct design bugs. Cheaper, generic systems built by local shops often use a motherboard from one of the many smaller manufacturers. For your own peace of mind, insist on a name-brand motherboard—the extra cost should be less than $100.

Get the right chip set. The PC's chip set controls the flow of data between the CPU, main memory, and cache memory, and the various buses that connect to the graphics card, hard disk, and other peripherals. (See **FIGURE 2** for a list of recent chip sets from Intel.)

Whatever their inalienable endowments may be, all chip sets are not created equal. For example, a motherboard decked out with the latest 440BX chip set—which supports a 100-MHz bus speed between CPU and memory—runs at 100 MHz only when it is coupled with a PII-350 or -400 CPU. Though it can work with slower Pentium II chips, it does so at 66 MHz, minus the big performance gains.

So if you can't afford such a fast CPU, buy a motherboard with the slightly older and much cheaper 440LX chip set.

You'll find a wealth of information and reviews of different motherboards at www.sysopt.com/mboard.html.

Kirk Steers is a PC World *contributing editor.* Hardware Tips *welcomes questions and tips and pays $50 for published items.* *See page 14 for contact information.* ■

EIDE internal SuperDisk LS-120
$120 street; Hi-Val; 800/448-2596; www.hival.com
INFONET NO. 602

LS-120 EIDE drive
$110 street; Digital Research; 972/241-0200; www.dr-tech.com
INFONET NO. 603

LS-120 internal SCSI drive
$199 street; Winstation; 800/243-3475; www.winstation.com
INFONET NO. 604

LS-120 parallel drive
$150 list; Imation; 888/466-3456; www.superdisk.com
INFONET NO. 605

Zip drive
$100 list (EIDE internal), $140 list (parallel port), $140 list (external SCSI); Iomega; 800/697-8833; www.iomega.com
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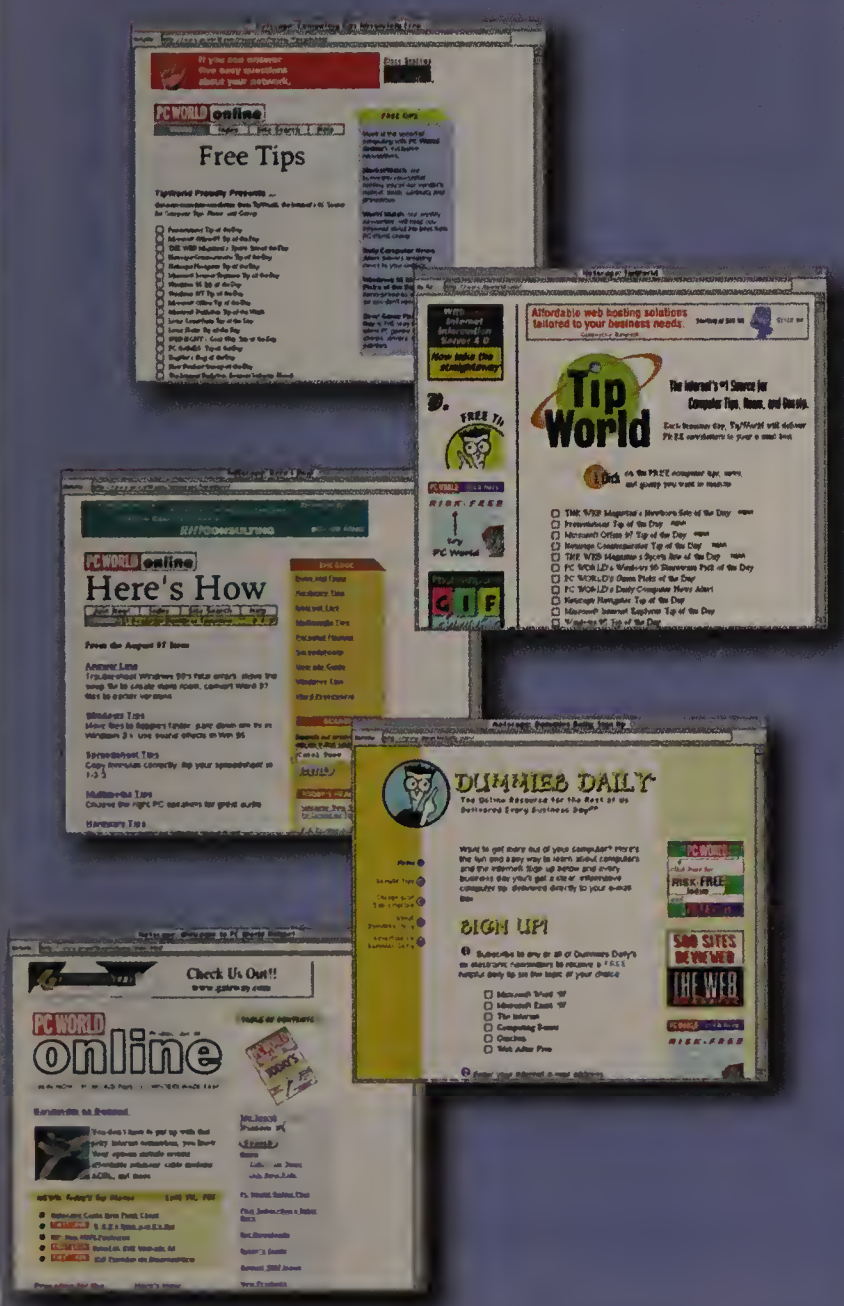

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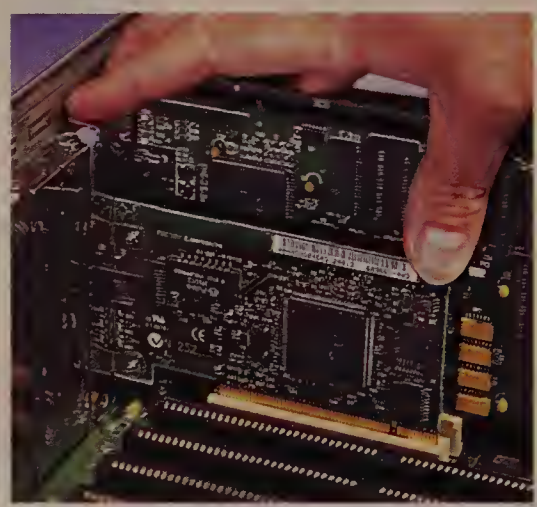
Get Connected With a Network

IF YOU HAVE more than one PC in your office (or even your home), consider installing a network. Networked computers can share files, printers, and even modems (if you buy extra software). Setting up a basic network is easy, and plunging hardware costs are making the task more affordable.

Windows 95 and 98 include a built-in peer-to-peer (PC-to-PC) networking capability that makes it a snap to set up small networks. If your business has more than a few PCs, however, you'll want a full-fledged network operating system such as Windows NT, Novell NetWare, or Linux.

Your hardware choices start with network interface cards. PCI cards are most common, but ISA versions are also available. NICs come in two speeds: 10 megabits per second, and 10 or 100 mbps (10/100 mbps). The slower, 10-mbps cards cost $20 to $30 and offer plenty of speed for sharing files, printers, or Internet access. The 10/100 cards sell for $50 to $80 and are worth the premium if you run heavy-duty applications such as a

1 Install the network card. Turn off your PC and take off the cover. Find a free slot, remove the metal cover on the rear of the PC, and insert the card. Fasten it with a screw.

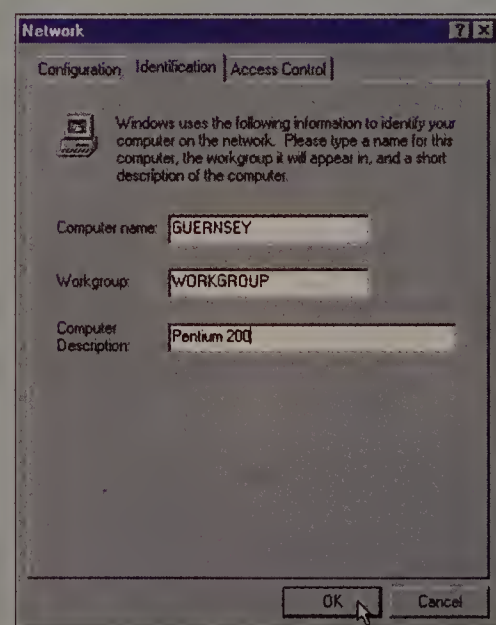


2 Connect the wires. Find a central location for the hub, from which you can easily run cables to each PC on your network. (Remember, the hub requires access to an AC outlet.) Plug a network cable into the connector on the rear of the network card (A), and then plug the other end into any port on the hub (B).

3 Install network card software. Turn on your PC. When Windows 95 starts, it'll detect the card and ask you to insert the driver disk. Insert the disk that came with the NIC and click *Next.* When Windows finds the driver, it'll display a confirmation screen. Click *Next.*

If Windows doesn't find the driver, click the *Browse* button on the Device Driver Wizard to look for a likely location for the driver, or check your manual. If you're not sure you've got the latest driver, run Update Device Driver Wizard by opening *Device Manager,* double-clicking on *Network adapters* and then your adapter, selecting the *Driver* tab, and then clicking the *Update Driver* button.

Windows will copy drivers off the floppy disk and will ask you to insert the original Windows disc so that it can copy other network files.



Again, Windows may get confused about where the needed files are located. Read the on-screen messages carefully as you proceed.

You'll have to enter a unique name to identify each PC on your network, as well as a workgroup name. Choose any name you wish for the PCs, but use *workgroup* for the workgroup name.

Then restart your PC.

PHOTOGRAPHS: KEVIN CANDLAND

central database or if you plan to expand.

If you intend to network only two PCs, you can get by with a pair of NICs and a *crossover cable*. Such cables come in lengths of up to 25 feet and cost $10 to $25. If your network has three or more computers, you'll need regular network cables and a *hub*, a central connection box. Hubs also come in 10- and 100-mbps speeds. A 10-mbps unit with four ports costs between $50 and $60; eight-port versions run about $70 to $80. The 100-mbps units are considerably pricier, starting at about $100 for four ports and $150 for eight ports. You can start with 10/100 NICs and a 10-mbps hub, and then upgrade to a 100-mbps hub as your needs expand and your budget allows.

If cost is a major concern, you can save some money by buying a networking kit. The $100 SOHOware Network Plus PCI Starter (www.sohoware.com) contains a pair of 10/100 NICs; a five-port, 10-mbps hub; and cabling. A 100-mbps hub version sells for about $150. But you can just as easily buy the individual components yourself. Most computer dealers carry them, and the parts may be simple to install without kit instructions. NICs and hubs are always compatible. Some popular component makers include 3Com (www.3com.com), Asanté (www.asante.com), Compex (www.cpx.com), D-Link (www.dlink.com), Intel (www.intel.com), and Bay Networks (www.baynetworks.com).

If you go the parts-and-pieces route, remember to get Category 5 10Base-T cables, which look like wide standard phone cables. The cost is about $15 for a 25-foot cable and $25 for a 50-foot cable.

To get connected, follow the steps below for each PC on your network.

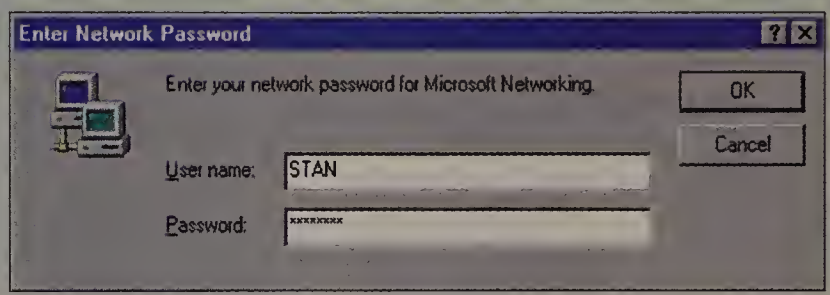
Stan Miastkowski is a PC World *contributing editor.* ■

4 Set up an optional start-up password. The first time you start your PC after installing the network card software, a box will pop up on your screen and ask you to enter a user name and a password for Microsoft Networking.

Enter a user name. It will automatically appear every time you start up your computer. (For convenience, you could use the PC name you specified in Step 3.)

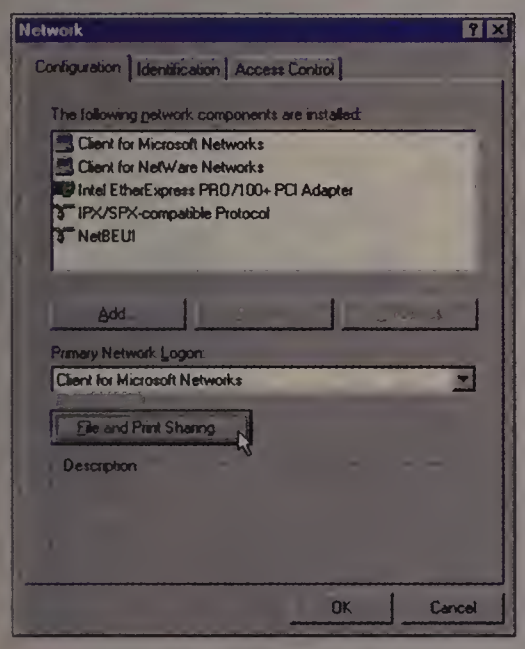
If you don't want to bother with a password, leave the line blank and then click *OK*. Otherwise, enter your password, click *OK*, and confirm your choice by entering it again.

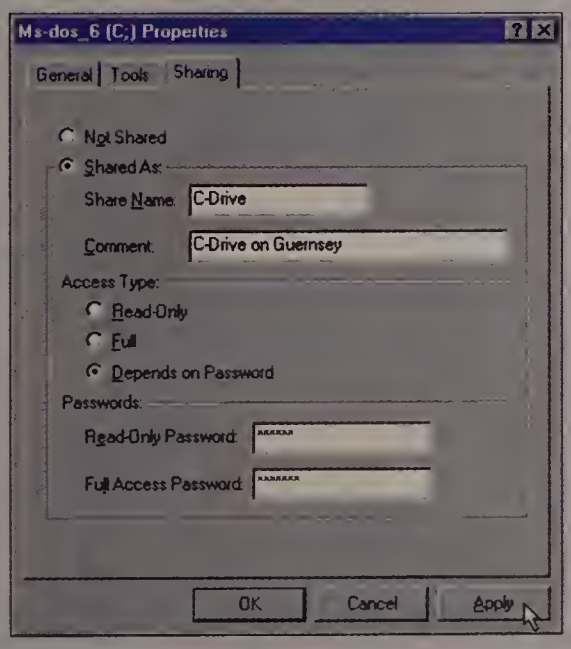
Note: Choose a password that is easy for you (but not for others) to remember. If you forget it, you'll still be able to run Windows 95, but you won't be able to access the network.

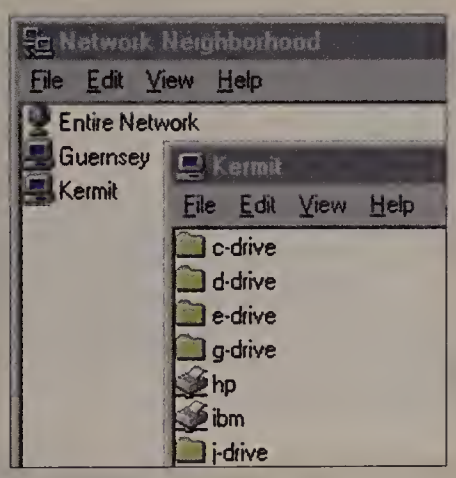


5 Set up file and printer sharing. In Explorer or on the desktop, right-click *Network Neighborhood*, select *Properties*, and click the *File and Print Sharing* button under the Configuration tab. To share drives on this PC, check the appropriate box. Also check the appropriate box if you want to share printers. (Don't check the box if you don't have a printer connected to this PC.) Click *OK* twice. You'll need to restart the PC again before specifying what to share.

If you chose to share drives, in Explorer or on the desktop, open *My Computer*, right-click the drives or directories you want to share, choose *Sharing*, and fill in the box. If you chose to share an entire drive, all of that drive's subdirectories will also become available on the network.







6 Use your connections. Open the *Network Neighborhood* icon to see a list of all the PCs on the network. Double-click the PC you want to work in and choose the drive you wish to access. Consult Windows Help for information on mapping (assigning) network drives.

To use a printer that is connected elsewhere on your network, open *My Computer* and choose *Printers*. Check the *Network Printer* box, click *Next*, and follow the ensuing directions.

If you experience any problems accessing a printer or PC on the network, check your cable connections. Make sure that the PCs you want to access have sharing enabled and have their drives set up for sharing.

If this doesn't resolve the problem, run the network card diagnostics. Some NICs automatically install a diagnostics icon in your Control Panel when you install the NIC, while others make you run the diagnostic utility by booting from a floppy disk.

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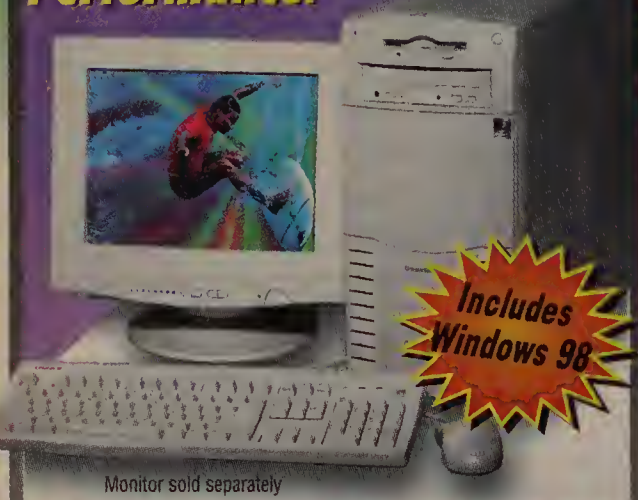

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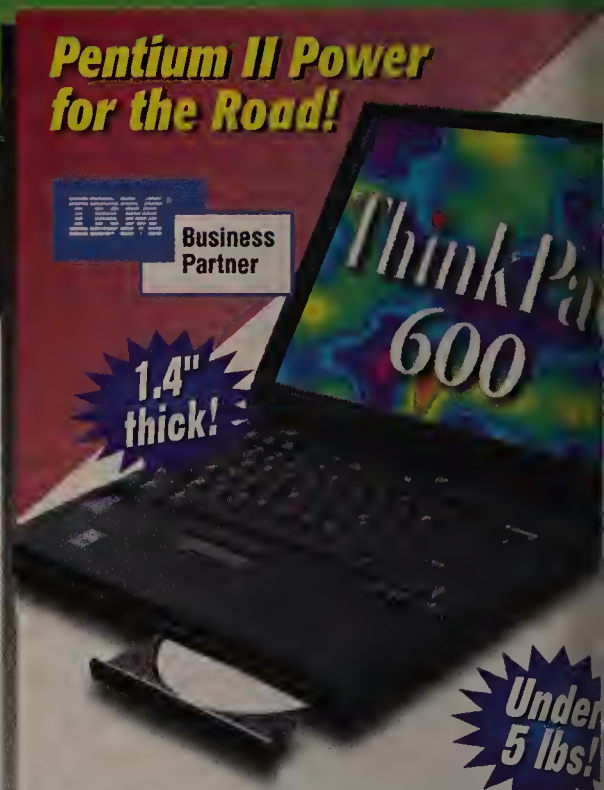

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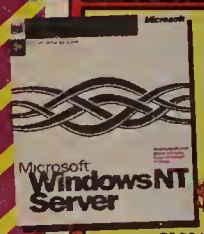

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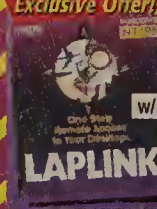

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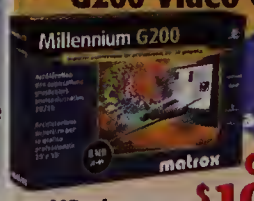

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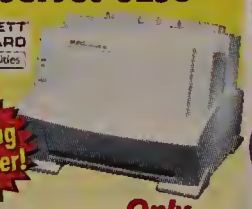

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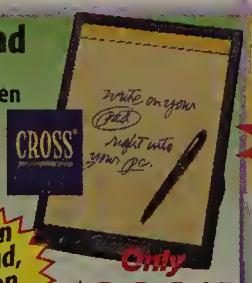

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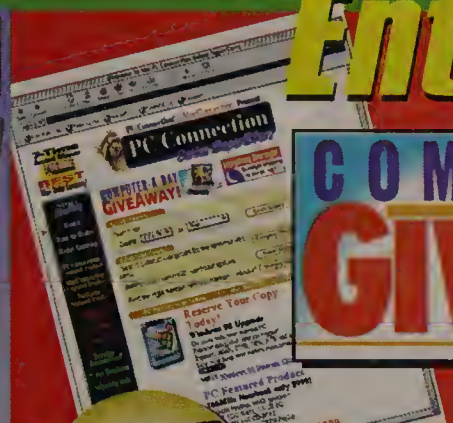

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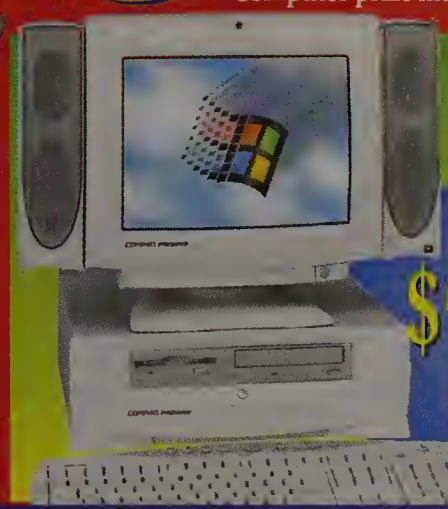

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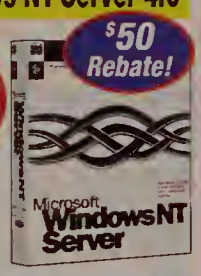

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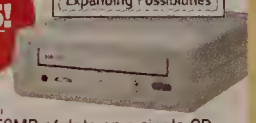

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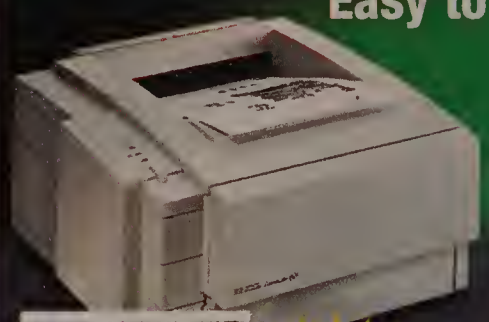

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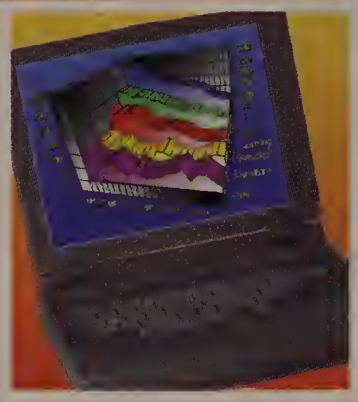

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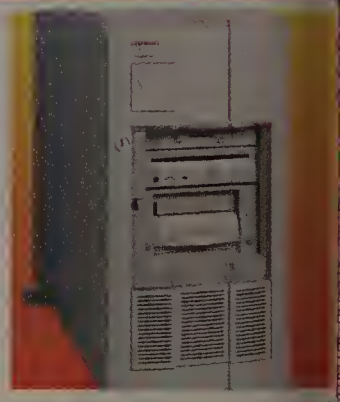

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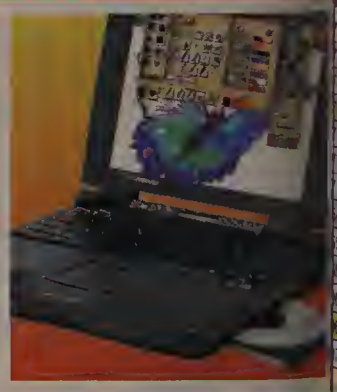

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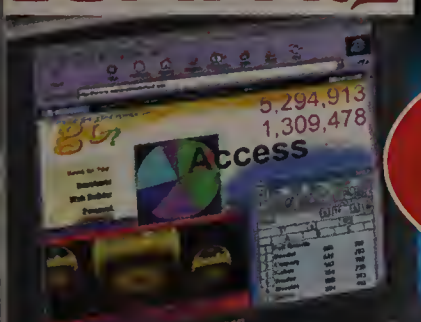

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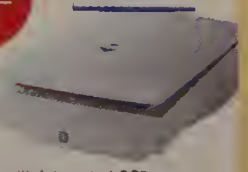

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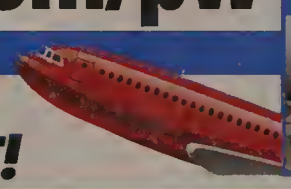

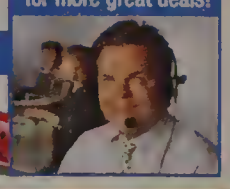

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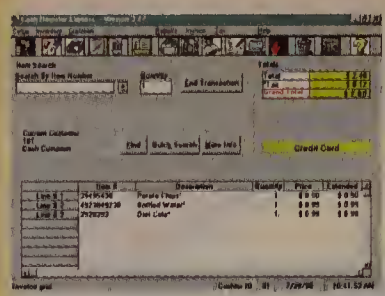

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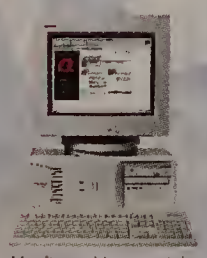

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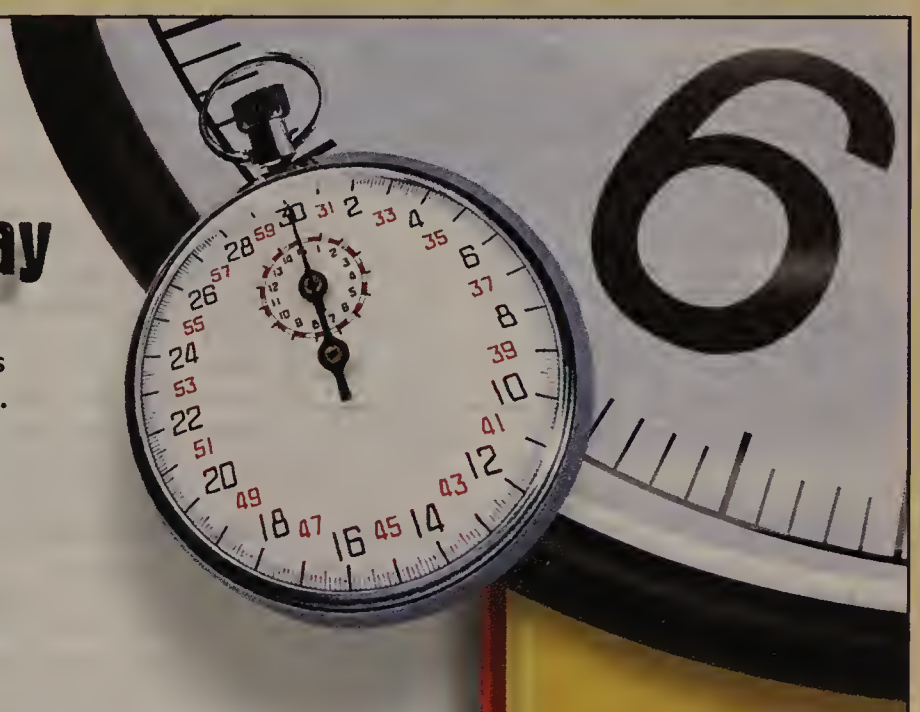

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J19327	330CDS	P266MMX	32	4.1GB	20X	-	12.1DSTN	$1,635
J19326	330CDT	P266MMX	32	4.1GB	20X	-	12.1TFT	$1,923
J19358	4000CDS	PII-233	32	4.1GB	24X	-	12.1DSTN	$1,923
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F90158	320CDT	P266MMX	32	4GB	-	56K	0.4TFT	$2,692
J19362	7000CT	PII-266	32	4.3GB	-	56K	2.1TFT	$2,884

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G99811	560X	P233MMX	32	4GB	24X	12.1TFT	$2,482
G99861	600	PII-233	32	3.2GB	24X	13.3TFT	$3,819
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G64156	4880	P2-400	64	12GB	DVD	56K	$2,208
G64195	5020	Celeron 300	64	8GB	32X	56K	$1,079
G64185	5030	P2-300	64	8GB	32X	56K	$1,262
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G64187	5140	P2-400	96	8GB	DVD	56K	$1,957
G64186	5610	P2-350	64	8GB	DVD	56K	$1,792
G64188	5630	P2-400	128	12GB	DVD	56K	$2,185
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J25806	PII-300	32	3.2GB	24X	DT	WIN 95	$1,177
J25807	PII-333	32	3.2GB	24X	DT	WIN 95	$1,301
J25808	PII-350	64	6.4GB	24X	DT	WIN 95	$1,630
J25809	PII-400	64	6.4GB	24X	DT	WIN 95	$1,760

Deskpro EP Series Tower

Order#	Processor	Ram	HD	CD	Modem	Factor	System	Price
J25820	Celeron 266	32	2.1GB	24X	56k	MT	WIN 95	$1,053
J25811	PII-266	32	4.3GB	24X	56K	MT	WIN 95	$1,344

Deskpro EN Series

Order#	Processor	Ram	HD	CD	Factor	System	Price
J25878	Celeron 300	32	3.2GBGB	24X	DT	WIN 95	$1,079
I86882	PII-266	16	3.2GBGB	24X	DT	WIN 95	$1,155
I86887	PII-333	32	6.4	24X	MT	WIN 95	$1,614
I86883	PII-300	32	3.2GBGB	24X	DT	WIN 95	$1,253
I86884	PII-333	32	3.2GBGB	24X	DT	WIN 95	$1,377
I86885	PII-350	32	6.4GBGB	24X	DT	WIN 95	$1,516
J25882	PII-400	64	6.4GBGB	24X	DT	WIN 95	$1,932
J25802	PII-400	64	9.1UWSC	24X	MT	NT4.0	$2,601

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COMPAQ Prof Workstation Series

Prof Workstation AP200 Tower

Order#	Processor	Ram	HD	CD	Card	Factor	Price
H76429	PII-350	64	6.4GB	32X	2D/3D	MT	$2,283
H76430	PII-400	64	6.4GB	32X	2D/3D	MT	$2,525

Prof Workstation AP400

Order#	Processor	Ram	HD	CD	Card	Factor	Price
H76418	PII-350	64	6.4GB	32X	2D+	MT	$2,579
H76421	PII-400	128	4.3UWSC	32X	2D+	MT	$3,191

COMPAQ Notebooks

Compaq Notebook H38560

1700/P2-23332/4GB/24X/56K/12.1TFT

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Aramada Notebooks

Order	Model	Processor	Ram	HD	CD	Modem	Display	Price
J38556	1505DMP	-200MMX	32	2.1GB	20X	56K	12.1CSTN	$1,644
H38536	1592DMT	P-233MMX	32	3.2GB	20X	56K	12.1TFT	$2,498
H38560	1700	P2-233	32	4GB	24X	56K	12.1TFT	$2,864
J10515	7800	P2-266	64	5G	20X	33.6	13.3TFT	$4,335

Presario Notebooks

Order	Model	Processor	Ram	HD	CD	Modem	Display	Price
G64189	1230	MGX-233	32	3.2GB	24X	56K	12.1DSCN	$1,456
G64190	1625	AMD K6-266	32	3.2GB	24X	56K	12.1DSCN	$1,920
G64191	1640	AMD K6-266	32	4GB	24X	56K	12.1TFT	$2,184
G64192	1650	P2-266	64	4GB	24X	56K	12.1TFT	$2,784
H38585	1655	P2-266	64	4GB	24X	56K	13.3TFT	$3,062

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HP D6530T Celeron 266

32/2.5GB/DT/WIN 95

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HP BRIO PC Series

Order#	Mfg Part#	Processor	Ram	HD	CD	NIC	Factor	System	Price
D6750T	D6750T	Celeron266	32	2.1GB	-	10/100	DT	WIN 98	Call
D6766A	D6766A	PII-333	32	4.3GB	32X	-	DT	WIN 98	Call
D6637T	D6637T	PII-350	32	4.3GB	-	-	MT	WIN 98	Call
D6632B	D6632B	PII-400	64	8GB	32X	-	MT	NT 4.0	Call

HP VE PC Series

Order#	Mfg Part#	Processor	Ram	HD	CD	NIC	Factor	System	Price
H58244	D6530T	Celeron 266	32	2.5GB	-	-	DT	WIN 95	$922
H58264	D6536T	Celeron 300	32	3.2GB	-	10/100	MT	WIN 95	$1,040
H58250	D6550T	PII-266	32	3.2GB	-	-	DT	WIN 95	$1,096
G99066	D6552N	PII-266	32	3.2GB	-	10/100	DT	NT/95	$1,233
G99065	D6551A	PII-266	32	3.2GB	-	-	MT	WIN 95	$1,147
H58252	D6560T	PII-333	32	3.2GB	-	-	DT	WIN95	$1,389
H58254	D6570T	PII-350	32	3.2GB	-	-	DT	WIN95	$1,562
H28255	D6584T	PII-400	64	4.4GB	32X	-	MT	WIN 95	$2,020

HP VL PC Series

Order#	Mfg Part#	Processor	Ram	HD	CD	NIC	Factor	System	Price
J30400	D5720T	PII-266	32	3.2GB	-	-	DT	NT/95	$1,226
E89172	D5724N	PII-266	32	3.2GB	-	10/100	DT	NT/95	$1,398
G99053	D5735A	PII-266	32	4.3GB	24X	-	MT	NT/95	$1,468
H58256	D5731T	PII-300	32	4.3GB	-	-	DT	NT/95	$1,399
H58257	D5797T	PII-333	32	4.3GB	-	-	DT	NT/95	$1,555
H58258	D5880T	PII-350	32	4.3GB	-	-	DT	NT/95	$1,726
G99061	D5882A	PII-400	64	6.4GB	32X	-	DT	NT/95	$2,408

HP XA PC Series

Order#	Mfg Part#	Processor	Ram	HD	CD	NIC	Factor	System	Price
H72413	D4796S	PII-266	32	4.3GB	24X	10/100	DT	NT 4.0	$1,795
G51278	D4692N	PII-333	64	6.4GB	24X	0/100	DT	NT 4.0	$2,857

HP XU Workstation

Order#	Mfg Part#	Processor	Ram	HD	CD	NIC	Factor	System	Price
H51281	D4695N	PII-300	64	4.5GBSC	24X	10/100	MT	NT 4.0	$2,965
J30401	D6331T	Xeon400	128	4.5GBSC	32x	10/100	MT	NT 4.0	$4,817

HP XW Workstation

Order#	Mfg Part#	Processor	Ram	HD	CD	NIC	Factor	System	Price
H72406	D6475N	PII-333	64	4.5GBSC	24X	10/100	MT	NT 4.0	$3,176
H72417	D6480N	PII-400	128	4.5GBSC	32X	10/100	MT	NT 4.0	$4,797

HP Omnibook Notebook

Order#	Model#	Processor	Ram	HD	CD	Display	Price
F1580WT	J305142100	P233MMX	32	3.2GB	24X	2.1DSTN	$1,770
F1599WT	J30522 2100	PII-266	32	4GB	24X	12.1TFT	$3,354
F1462WT	J30507 4100	PII-233	32	4GB	24X	13.3TFT	$3,190
F1479WT	H58241 4100	PII-266	32	4GB	24X	14.1TFT	$3,880
F1442WT	J30503 7100	PII-266	32	8GB	24X	14.1TFT	$4,705

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G67655	70TX	P-200MMX	32	3.2GB	20X	56K	12.1TFT	$1,571
G67656	790TX	P266MMX	32	4GB	20X	56K	12.1TFT	$1,769
J13317	985TX	P233MMX	32	5GB	20X	56K	13.3TFT	$2,653
G67660	990TX	P2-266	32	5GB	24X	56K	13.3TFT	$3,242

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J26004	Plus 6392	P266MMX	32	3.2G8	20X	56K	2.1HPA	$1,870
J26008	PRO 5290	PII-233	32	3.2G8	24X	56K	2.1TFT	$2,618
J26007	PRO 7755	PII-266	64	4G8	24X	56K	3.3TFT	$3,366

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J77030	CPD-100ES	15/14	1280X1024	0.25mm	$246
J77063	CPD-L150	15"	1024X76	TFT	$1,876
J77032	CPD-200ES	17/16	1280X1024	0.25mm	$427
J77033	CPD-200GS	17/16	1280X1024	0.25mm	$545
J77035	GDM-400PS	19/18	1600X1280	0.25mm	$804
J77036	GDM-500PS	21/20	1600X1200	0.25mm	$1,292
J77066	CPD-520GS	21/19	1600X1200	0.25mm	$1,211
J77065	GDM-F500	21/19	1600X1200	0.25mm	$1,329

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15"/13",1280X1024, 28MM

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J76722	A500	15/13	1280X1024	28MM	$217
J76734	LCD1510	15	1024X768	TFT	$1,503
J76723	A700	17/15	1280X1024	0.28	$404
J76725	E700	17/15	1600X1200	0.25	$517
J76737	E900	19/18	1600X1200	0.28	$750
J76716	E1100	21/19	1600X1200	0.28	$984
J76741	E1100+	21/19	1600X1280	0.24	$1,061
J76742	E1250+	21/19	1800X1440	0.28	$1,174
C71295	LCD2000	20	1280X1024	TFT	$5,634

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Order #	Model #	Size	Re	DP	Price
G09430	Q51	15/13	1280X1024	0.28	$165
G09470	V55	15/13	1280X1024	0.28	$192
G09438	VPA150	15	1024X768	TFT	$1,390
C31906	Q71-2	17/16	1280X1024	0.28	$243
G09468	V75	17/16	1600X1200	0.26	$364
G09444	GS771	17/16	1280X1024	0.27	$369
J06417	V95	19/18	1600X1280	0.26	$509
G09442	G790	19/18	1600X1200	0.25	$542
G09410	Q100	20/18	1600X1280	0.28	$862
C31954	G800	20/18	1600X1280	0.028	$964
G09446	G810	21X20	1600X1200	0.25	$997

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Order#		Price
H27074	Stylus Color 600 1440dpi,6ppm/4ppm	$187
I67504	Stylus Color 640 440x720dpi,Win95/NT	$194
G21292	Stylus Photo 700 1440dpi,up to 6ppm	$263
I67503	Stylus Color 740 1440dpi,Par/Ser/US8	$280
H27072	Stylus Color 800 1440dpi, Mac/PC	$280
G21290	Stylus Color 850 1440cpi,Mac/PC,8pm	$348
G21293	Stylus Photo EX 1440dpi,11x17' Print	$459
G21250	Stylus Color 1520 1440dpi, up to 6ppm	$731
G21228	Stylus Color 3000 1440dpi, Large Form	$1,632

HEWLETT PACKARD

Order#		Price
C2655A	HP Deskjet 340 600dpi,3ppm,Portable	$263
C4562B	HP Deskjet 659C 600dpi,up to 5ppm	Call
C5895B	HP Deskjet 710C 600dpi,up to 6ppm	Call
C5870A	HP Deskjet 720C 600dpi,up to 8ppm	$290
C5876A	HP Deskjet 890CXi PhotoREt ii,9ppm	$382
C2680A	HP Deskjet 1120CXi PhotoREt,13x19	$467
C4530A	HP Deskjet 2000CXi 10ppm,8.5x14	$747

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HEWLETT PACKARD Laserjet 6Lxi

600dpi 6ppm

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C3996A	HP Laserjet 6Lxi 600dpi 6ppm	$378
C4213a	HP Laserjet 6Pxi 600dpi 8ppm	$727
C3982A	HP Laserjet 6MP 600dpi PC/Mac,8pp	$870
C4177A	HP Laserjet 3100XI Fax,Copy,Scan"	$628
C4118A	HP Laserjet 4000 1200dpi 17ppm	$1,081
C1120A	HP Laserjet 4000N 1200dpi NIC	$1,393
C4119A	HP Laserjet 4000T 1200dpi 2nd Tray	$1,225
C4121a	HP Laserjet 4000TN NIC 2nd Tray"	$1,536
C4110A	HP Laserjet 5000 1200dpi,16p 11x17"	$1,422
C4111A	HP Laserjet 5000N 1200dpi NIC""	$2,010
C4112A	HP Laserjet 5000TN NIC 2nd Tray"	$2,534
C4085A	HP Laserjet 8000 1200dpi, 24ppm	$2,337
C4086A	HP Laserjet 8000N 1200dpi,24ppm,NIC	$2,617
C4087A	HP Laserjet 8000DN NIC,2nd Tray,24M	$3,095
C3962A	HP Color Laserjet 5 up to 10ppm	$3,794
C3962A	HP Color Laserjet 5M NIC,84MB Std	$4,819

LEXMARK

Order#		Price
I72701	Optra S1255 12ppm, 1200dpi	$928
I72703	Optra S1625 16ppm, 1200dpi	$997
I72705	Optra S1855 18ppm, 1200dip	$1,090
I72707	Optra S2455 24ppm 1200dpi	$1,965
G33012	Optra SC1275 Color Laser	$2,949

OKIDATA

Order#		Price
H728457	Okipage 4W 600dpi,4ppm,LED	$159
G72603	Okipage 6E 600dpi,6ppm, LED	$294
G72638	Okipage 10I 600dpi,10ppm, LED	$589
H28481	Okipage 16N 600dpi,16ppm, LED	$866
G72628	Okipage 20 600dpi,20ppm, LED	$1,113

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Hewlett Packard ScanJet 6100Cse Scanner	$799

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Epson Expression 836XL	$2488

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Microtek ScanMaker E6 standard	$279

Minolta

Minolta Dimage Scan Dual	$572

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UMAX Astra 1200S w/ Photoshop LE	$296
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USRobotics V.34 33.6K externak w/ fax	$104
USRobotics Voice V.34 33.6K internal w/ fax	$137
USRobotics Voice V.34 33.6K external w/ fax	$137
USRobotics 56K V.90 internal	$157
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USRobotics 56K Winmodem V.9	$97
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Hayes ACCURA 56K V.90 external	$178
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SurgeArrest Professional	$27
SurgeArrest Network	$31

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3C589-TP EtherLink III LAN PC Card 108T	$129
3C562D-TP EtherLink III 33.6 PC Card 108T	$259
3C905-TX Fast EtherLink XL 10/100 PCI	$88
3C900-TPO EtherLink XL 108T PCI	$53
3C900-COM8O Ethernet XL PCI combo	$129
Courier 56K modem x2 internal	$209
Courier 56K modern x2 external	$245
Impact IQ ISDN modem externa	$199
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OfficeConnect ISDN LAN modem	$386
SuperStack II Hub 12-port 10BT	$498
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3Com 32-bit Fast EtherLink XL CardBus	$145
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3Com 33.6K w/ XJACK	$168
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3Com 33.6K 10BT LAN+modem combo	$297
3Com 56K w/ XJACK	$212
3Com 56K cellular w/ XJACK	$213
Hayes ACCURA 56Kflex	$184
Hayes OPTIMA 56K	$198
Hayes OPTIMA 56K w/ Ezjack	$197
Intel EtherExpress PRO/100 16-bit PC Card Enet/56K	$309
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Kodak DC120 Zoom digital camera	$696
Kodak DC210 Zoom digital camera	$699
Microtek EyeStar videoconferencing camera	$98
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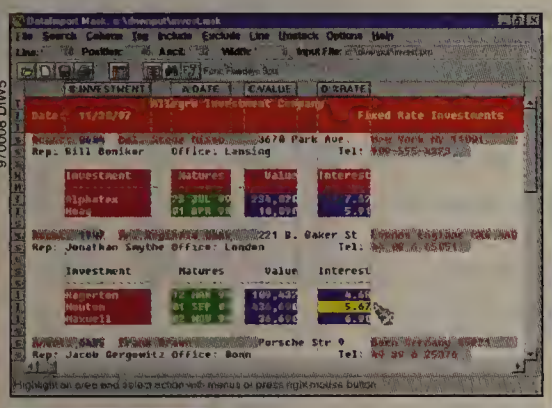

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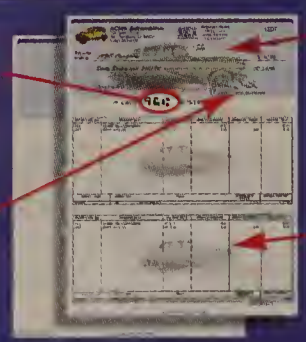

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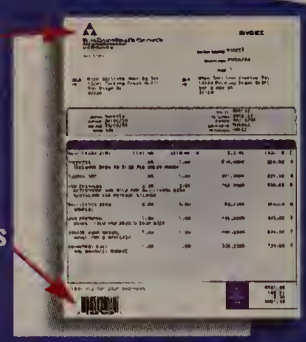

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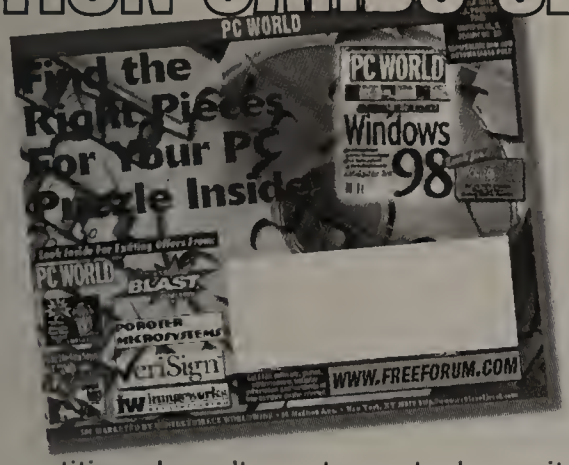

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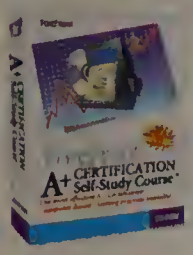

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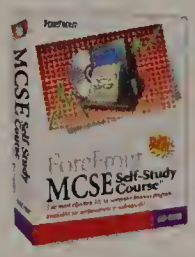

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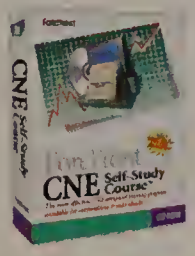

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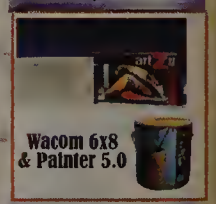
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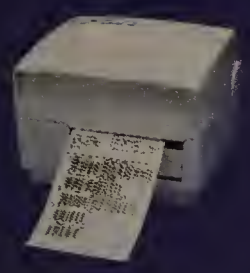

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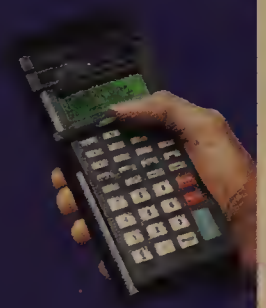

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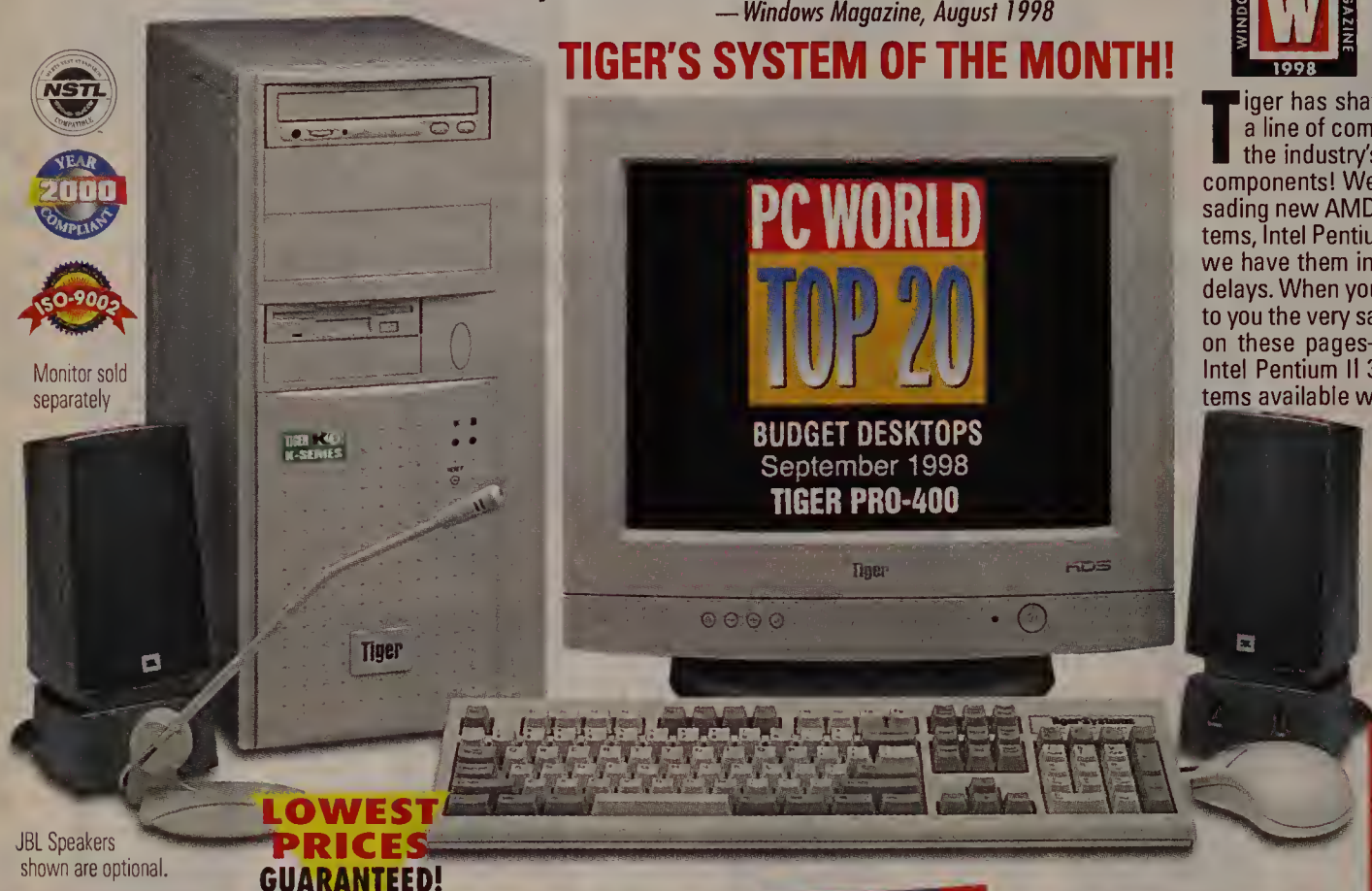

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—PC Computing, *May '98*

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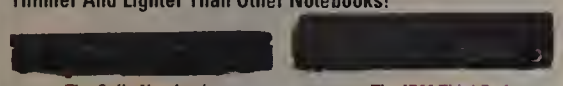
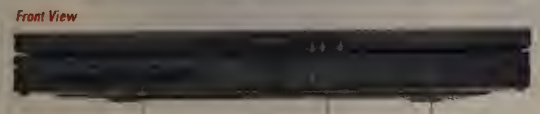


The Solis Notebook *The IBM ThinkPad*

The wafer-thin Solis ST is just 1.4-inches deep! That's about half as deep as the IBM ThinkPad. Weighs 6.4 pounds!

Solis Notebooks Are Loaded With Features/Connectivity!

Front View



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Right Side View

Right speaker | External speaker | Microphone | Headphone-out | PC Card port

Rear View

Parallel port | Serial port | XVGA output | Docking port

Close-Up: Tiger's Solis Notebook

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DUAL CONTROLS: Touch Pad with 2 Buttons.
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POWER: 9 Lithium-Ion battery gives you 3.3 hours operation with Power Management Unit disabled; charges in 1.7 hours.
I/O PORTS: Includes one port each for serial, parallel, external FDD module, VGA, keyboard, mouse, docking station, USB.
OPERATING SYSTEM: Microsoft Windows 98, pre-loaded

DVD playback module; available as an option.

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SOST-13J	Intel Pentium II 233	32MB EDO	2.1 GB UDMA	24X	13.3" Active Matrix	$71	$1,999.99
SOST-14A1	Intel Pentium II 233	64MB EDO	2.1 GB UDMA	24X	14.1" Active Matrix	$77	$2,169.99
SOST-14D1	Intel Pentium II 266	64MB EDO	4.0 GB UDMA	24X	14.1" Active Matrix	$87	$2,459.99
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Sick of Spam? Let's Can It!

IN THE INTEREST of fairness and objectivity, I'd like to begin by mentioning all the positive things I can think of about e-mail spam.

Okay, that's enough. Now permit me to say just as fairly and objectively that I want to crush it. I want to kill it. I want to stomp on it with both feet until it hollers for mercy. Then I want to jump up and down on it some more and eradicate it from the universe.

How big is the problem? It depends who you are and what you do, but in the first six months of this year, I received more than 800 pieces of electronic rubbish—an average of more than 6 messages every day of the business week.

And I'm lucky. My friend Adam Engst, publisher of the Macintosh-oriented online newsletter TidBits, has received about 3400 junk messages since April 1997 and currently averages about 10 per day. But unlike me, he's doing something aggressive about it. Along with his wife and two members of his staff, he's suing.

His action targets an outfit called WorldTouch Network that blessed him and his staff with nearly 100 hunks of junk in less than a month. (Details of the suit are posted on the TidBits site at www.tidbits.com/anti-spam.) The suit is the first under a new Washington state law that makes e-mail to or from a Washington resident illegal if the e-mail uses a third party's Internet domain name without permission, misrepresents its point of origin, or contains false or misleading subject lines.

I want to **crush** spam. I want to **kill** it. I want to **stomp** on it with both feet **until it hollers** for mercy.

CLEVER DISGUISES

LUCKY FOR ME, WorldTouch has managed to get only about two dozen spams into my mailboxes so far. Each came from a different, presumably bogus address. Each arrived by way of a circuitous route involving servers in places like Japan, Finland, and the Netherlands. And each used clever tricks to disguise the subject and sender information lines in order to foil filtering software. So all I can say is, Go Adam!

Washington state's law doesn't entirely ban unsolicited commercial e-mail, and it doesn't help those who live and work elsewhere. A bill in Congress aims to do both. Introduced by New Jersey Representative Christopher Smith, H.R. 1748—the "Netizens Protection Act of 1997"—extends to junk e-mail the same restrictions that effectively eliminated junk faxes. Under the proposed law, unsolicited e-mail must include legitimate identifying information, including an honest return address.

Other bills meant to address the problem go halfway at best. Most require honest identification. Some require individual mailers to honor individual requests that names be deleted. One proposes a "universal" exclusion list. The table at www.jmls.edu/cyber/statutes/email/fedtable.html offers a good summary, as well as a jumping-off point to other valuable sites. The Coalition Against Unsolicited Commercial Email (www.cauce.org), which supports the Smith bill, is another good resource on the legal issues.

LAW OF THE LAND

I'VE HEARD TWO basic arguments against banning spam. The first is that a ban would somehow violate First Amendment free speech rights. Sorry, but commercial speech has been regulated in various ways for years. There are limitations on what you can say about everything from tobacco products to mutual funds—and on where you can say it. The junk fax ban has been upheld in the 9th Circuit Court of Appeals, which noted that "unsolicited fax advertisements shift significant advertising costs to consumers." E-mail doesn't waste paper, but it eats up bandwidth and storage that in the aggregate are even more valuable.

The other antiban argument is that no law can regulate the international nature of the Net. Maybe so, but I'm willing to bet that forcing spammers offshore—no U.S. 800 numbers, no U.S. addresses—would slow the flow to a trickle.

Lots of clever schemes are afoot to slow down spam, including products that sow fake addresses as bait to ferret out the culprits. But they all require our spending time and money on a problem that should be legislated out of existence. Let's can spam now.

PC World *Contributing Editor Stephen Manes has been writing about computers and their discontents for more than 15 years. He is coauthor of* Gates, *a biography of Microsoft's chairman.* ■

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PC World™ (ISSN 0737-8939) is published monthly at $29.90 for one year (12 issues), $59.80 for two years (24 issues), $89.70 for three years (36 issues) by PC World Communications, Inc., 501 Second St. #600, San Francisco, CA 94107. Foreign orders must be prepaid in U.S. funds with additional postage. Add $20 per year for Canada and Mexico; add $46 per year for airmail for all other countries. Canadian GST Registration #R124669680. Periodicals postage paid at San Francisco, California, and additional mailing offices. Canada Post International Publications Mail Product, (Canadian Distribution) Sales Agreement No. 0463566. POSTMASTER: Send address changes to *PC World*, Subscription Dept., P.O. Box 55029, Boulder, CO 80328-5029. Editorial and business offices: 501 Second St. #600, San Francisco, CA 94107, 415/243-0500. Copyright © 1998, PC World Communications, Inc. All rights reserved. The trademark PC World is owned by International Data Group and used under license by PC World Communications, Inc. PC World Top 20™, Top 20™, PC World Top 10™, Top 10™, PC World Top 100™, Top 100™, and Consumer Watch™ are trademarks of International Data Group, Inc., and used under license by PC World Communications, Inc. Printed in the United States.

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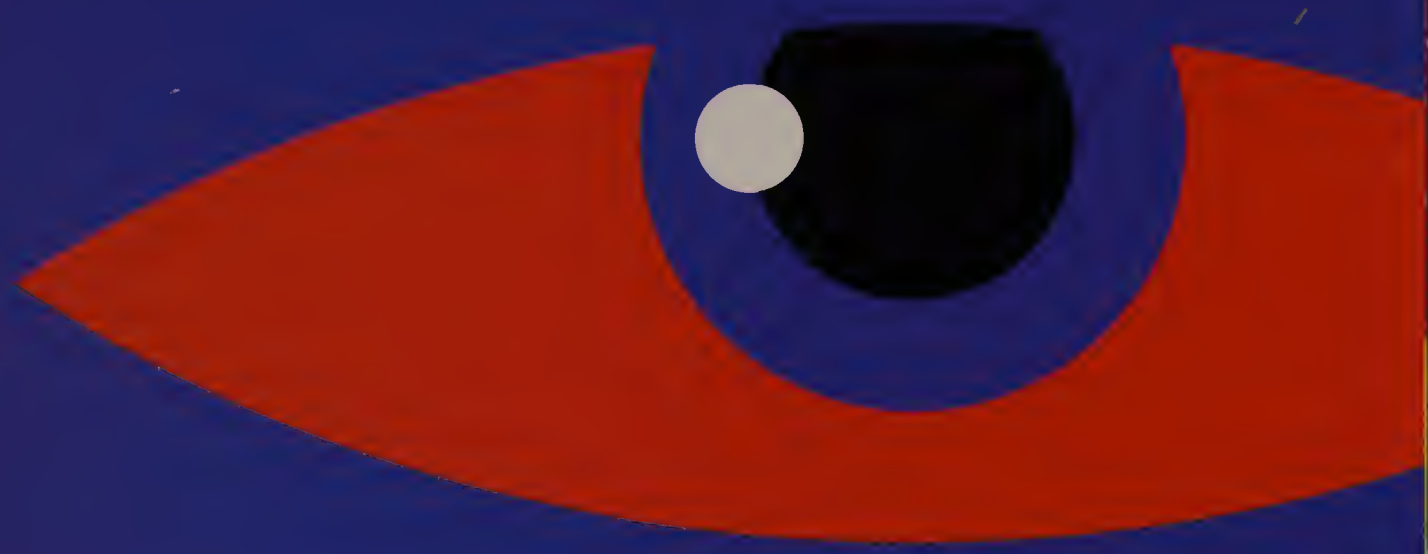

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